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HERMIT THRUSH AND YOUNG

The hermit thrush is a rare and shy forest bird, living in remote swampy places in the eastern United States.

"A strain has reached my ears from out the depths of the forest that to me is the finest sound in nature,—the song of the hermit-thrush. . . . It is not a proud, gorgeous strain, like the tanager's or the grosbeak's; suggests no passion or emotion,—nothing personal,—but seems to be the voice of that calm, sweet solemnity one attains to in his best moments. . . . A few nights ago I ascended a mountain to see the world by moonlight; and when near the summit the hermit commenced his evening hymn a few rods from me. Listening to this strain on the lone mountain, with the full moon just rounded from the horizon, the pomp of your cities and the pride of your civilization seemed trivial and cheap."—John Burroughs in *Wake Robin*.

"Sing on, sing on, you grey-brown bird,
Sing from the swamps, the recesses, pour your chant from the bushes,
Limitless out of the dusk, out of the cedars and pines. . . .
Loud human song, with voice of uttermost woe."

—Walt Whitman in *Memories of President Lincoln*

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Kentucky and Her Cave Men

FIRST IMPRESSIONS OF THE WILDERNESS MADE FAMOUS BY THE
EXPLOITS OF DANIEL BOONE, TOGETHER WITH A GLIMPSE
INTO THAT MYSTERIOUS UNDERGROUND WORLD
EXPLORED AND OCCUPIED BY EARLY
ABORIGINES OF AMERICA

By N. C. NELSON

Spurred on partly by the success of cave archaeology in Europe and partly by the supposed failure of cave archaeology in this country, the American Museum last summer made a preliminary investigation of a series of caverns and rock shelters in the state of Kentucky. This general locality was chosen deliberately as being well south of the limits of glaciation and in some respects similar to the regions in which flourished the cave peoples of Europe. The quest was not precisely to find America's Palæolithic man—although such a possibility could not be ignored. It was rather to ascertain whether in the caves of the Middle Mississippi country there was any trace of a relatively primitive stage of aboriginal development that might have given rise to the mound-builder culture as we know it at its best. In this the writer, who conducted the investigation, is at least morally certain that he succeeded.

In the spring of the year, after consulting with Professor Arthur M. Miller of the geological department of the State University at Lexington, two series of caves and rock shelters were inspected: one along the Kentucky River, south of Lexington, and the other along the Green River in the vicinity of the famous Mammoth Cave. This last named and the neighboring caverns were especially attractive because they had yielded valuable archaeological data for more than a century; and only four years ago the Honorable Albert C. Janin, of Washington, D. C., a trustee of the Mammoth Cave estate, generously presented to the American Museum, among other things, several choice textile specimens found in a large but less renowned cave on his property, known as the Salts Cave. The same gentleman, when last fall it became apparent that the Mammoth Cave entrance had served the aborigines as a camping place, was immediately interested and gladly gave permission for excavation. Only about five weeks' time was given to the work, but the results, though limited in themselves, amply warrant extended future investigations.—THE AUTHOR.

THE ancient cave dwellers of Europe, silenced by untold millenniums, have now almost come into their own. After barely a half century of labor we see at last in dim outline our rude progenitors—their face and form, their simple everyday existence, and just a glimmering of their feeling for the conditions which surrounded them. And as a result not

only are we beginning to find explanations for things as they are in respect to mankind, but also we are learning to look with absolute confidence to the future. The recent book on *The Men of the Old Stone Age*, by Henry Fairfield Osborn, marks a long step toward the viewpoint from which we, like the gods, shall be able to see the beginning from the end. But our advance is only

a step. Asia and Africa have not yet yielded up any profound secrets; and as for the troglodytes of America, who can tell?

Many European archaeologists hold that if we will but apply ourselves we shall find proof of aboriginal existence as ancient and primitive as anything so far discovered in the Old World. For instance, Professor Hugo Obermaier, lately of the Institut de Palæontologie Humaine, of Paris, with whom some four years ago I had the privilege of working for a few weeks in the famous Castillo Cave in Spain, once wagered his head on the outcome. At another time he offered to come over to America to find for us the necessary evidence "inside of three years." I had no such sanguine expectations; in fact, I thought I had reason for being incredulous; but there was something of a challenge in his attitude, and I was made to feel in honor bound to do something about it. The war has played havoc with his own plans, but he has not let me forget mine. His letters usually end with the repeated query, "Have you found Palæolithic man yet?"

The state of Kentucky has many and peculiar claims upon our interest—geographic, topographic, geologic, scenic, historic, and romantic, as well as archaeological. Under the circumstances no one will pretend to do justice to this section of our country in a few paragraphs, and we shall have to be content in this place with suggestions rather than delineations.

We have all read of Kentucky as the "untrodden wilderness" in which Daniel Boone played the hero. This sturdy pathfinder may have suffered somewhat at the hands of modern historians, but there can be no doubt that his exploits

have laid hold on the popular imagination, for many caverns—some that he never could have used as rendezvous—have been named after him; and as for his beloved wilderness, it is still there. The virgin forest I had little occasion to enter, but from all accounts it is, and always was, far less impenetrable than the half despoiled timberlands of today. To one accustomed to the vastness of the North American prairies and to the grandeur of the mountains and the mesas beyond them, there is something confining and repressing about a merely undulating forest country. It seems paradoxical that the spirit of freedom should have flourished in the valleys of Greece and of Switzerland, unless perhaps the secret lies in the provincializing nature of the topography. Referring to Switzerland, I was always conscious of a longing to be on top of the mountains where I could look away; although her scrupulously kept valleys with their matchless lakes and all that, evoked a response, to be sure. And so with Kentucky: you cannot see the forest for the trees, as the saying is, and you cannot find your way anywhere. In the Southwest one may keep his course for days by merely watching some familiar mountain peak on the horizon, but here it seems a risky thing to leave the beaten path without a guide. The novice would soon exhaust himself fighting through the brambly undergrowth, and he might slip into a "sink hole" and be lost forever in a great and fascinating underworld.

But if the aspect of grandeur seems wanting in Kentucky, it does not mean that scenic charm is not there. On the contrary, it is everywhere; but you have to view it one detail at a time. The field, the forest, the hill, and the stream—each and all make their spe-



SCENES LOVED BY DANIEL BOONE

The cliffs bordering the two beautiful rivers here shown, the Kentucky and the Dix, contain many caverns said to have been places of refuge for Kentucky's most noted pioneer. A delightful row up the Dix brought us to "Daniel Boone's Cave," a narrow cavern in process of formation by a stream of water, which could never by any stretch of imagination have been used as an abode

cial appeal, partly by virtue of intrinsic merit and partly by contrast with their varied general settings. Thus, for example, the open blue grass country about Lexington, with its splendid pikes, its mansions, its fine horses, and great dairies, seems a bit of the matured Old World transferred. Bounding it on the south, however, is the wild-looking gorge of the Kentucky River, presenting cliffs that are worthy of comparison with the Palisades of the Hudson; and beyond lies the wilderness, perhaps the primeval forest—I do not know.

If we transport ourselves about one hundred miles in a southwesterly direction over the semiforested tableland to the approximate geographical center of the state, we come to another equally enticing stream known as the Green River. We are told that it was named after General Nathanael Greene; but it is green in fact as well as in name, and it flows on calmly and majestically without giving a hint of its peculiar origin. Its bordering cliffs may be less abrupt, as a general thing, than those of the Kentucky, but the winding gorge is



The entrance to the Mammoth Cave at present measures about forty feet from side to side and twenty feet from floor to ceiling. The slope down which the steps lead is about thirty-five feet high and has been artificially graded. The floor in the foreground has also been raised by recent filling. A small stream of water falls over the mouth of the cave (see photograph, page 227), and as daylight reaches back about one hundred feet, this entrance is a cool and comfortable place on a hot summer's day and a convenient camping ground. Conditions were not so favorable, however, when the Indian lived here, because at that time the entrance was nearly closed with debris and very little daylight entered.



General view within the vestibule of Mammoth Cave, showing some of the trenches which the American Museum Expedition dug for the purpose of examining the Indian refuse



In this small chamber lay the skeleton of a woman in a rock shelter on Green River, six miles below the Mammoth Cave. This type of stone grave burial is common to the Ohio Valley region, and is regarded as belonging to a relatively late period of Indian history. The box-like coffin was made by setting up a number of stone slabs around an oval space about two and one half feet wide by three and one half feet long, the whole being covered by two larger slabs

just as deep. Dense foliage of oak, beech, sycamore, hickory, walnut, chestnut, dogwood, and other deciduous trees, screens all but the most pronounced scars on the sharper curves, and whether you are on the river or at the top of the gorge, you are seldom permitted to see more of the landscape than you can appreciate at a glance. In the early morning hours of May these woods were alive with song birds and I was told, confidentially, that fishing was excellent in the stream; but my own especial interest took me to quite another world, the region whence come the waters of the Green River.

If one goes prowling over the forested tableland, he soon becomes aware of several unusual things. In the first place, he cannot fail to notice occasional eminences, sometimes of a pyramidal character and often several hundred feet high. These heights are known as "knobs," and they appear to register for us the amount of erosion to which this section of the country has been subjected since it was lifted out of the sea. Excellent as "lookouts," these knobs are, besides, of especial interest to the archæologist, because many of them are also natural strongholds and as such were once occupied by the Indian. In the second place, the adventurer will be struck by the singular fact that he finds no streams to cross. Here and there he may discover valley-like depressions—some of them large enough to swallow up an appreciable slice of Manhattan Island; but whether or not they have an outlet to the river gorge, there is seldom any water to be seen in them. Passing on, he will encounter again and again sudden depressions of smaller dimensions, some oval, some bowl-shaped; some perhaps less than fifty feet in depth and diameter, and others possibly three

hundred feet deep and several hundred yards across. In a few instances a small pool of water may reflect the sky and surrounding landscape, but ordinarily the big bowl is dry, and there may be a visible hole in the bottom. The really inquisitive explorer may discover a strong air current going in or out of this hole; and if he sit down to reflect at all on the strange phenomenon, a long series of observed facts will soon fall into definite relations, and the mystery of the Green River sources will be solved. In brief, the whole three-hundred-foot limestone formation between the top of the plateau and the river level is actually honeycombed with caverns; the depressions in the plateau surface, known as sink holes, are merely collapsed cave roofs; and the rainfall on the plateau is caught up in these thousands of sink holes, which act as so many funnels for the labyrinthian cave system below, that finally conducts it to the river.

How the water got started on its underground course we cannot stop to explain; but it has been at work probably for millions of years and has literally eaten out several successive systems of passages, the topmost vaults being of course exceedingly old and now in process of refilling. In the Mammoth Cave, for example, there are no fewer than five superposed sets of galleries, the upper one being close to the surface of the plateau and the lower one so far down that the river floods back up into it every spring. And the Mammoth Cave is not a mere local feature. There are said to be more than eight thousand square miles of limestone formation in Kentucky suitably disposed for the development of immense caves. This means that the state possesses thousands of miles of subter-



A DOOR TO THE UNDERWORLD OF KENTUCKY

This yawning black mouth is the only known entrance to the Mammoth Cave. In 1811, so the story goes, while this opening was still almost choked with fallen trees and rocky débris, a hunter named Hutchins, in an exciting chase after a bear, followed the animal into a small hole among the rocks, discovering for the world this famous cavern



"Violet City" is reached at the end of a long walk through dark corridors and mysterious side chambers. When the guide throws his lighted brands into the dark corners, a thousand fairy beams are reflected from the many colored stalactites which drop from the ceiling to meet the up-springing stalagmites of the floor. On one side of the chamber a veritable pipe organ is formed, called the "Chimes," the stalactites giving forth musical sounds when struck. *Courtesy of John P. Morton & Company, Louisville*



A distinctly new experience is the short ride on the Echo River, deep down in the Mammoth Cave. We sang "My Old Kentucky Home" and "Way Down upon the Suwanee River" and were answered by hundreds of musical murmurs as the great resonance chamber above us reverberated the sounds again and again. *Courtesy of John P. Morton & Company, Louisville*

ranean vaults, constituting a world in themselves.

Here the mere tourist as well as the chemist, the geologist, the palæontologist, the botanist, and the naturalist could get enough material each for a great book. Consequently it is almost useless for us to enter even one cave for purposes of description. Many other hands have tried it. We are told that more than four hundred books, pamphlets, scientific treatises, and magazine articles have been printed about the Mammoth Cave alone; and among the great variety of talent so employed have been such "wordpickers" as Nathaniel Willis and possibly Bayard Taylor. But no two visitors to this wonder of the New World are impressed equally by the same phenomena. For myself, the cave as a cave excited no unusual interest; while the cave as a century-old repository of slowly accumulated historic and biographic facts, of wit and humor and imaginative interpretation, handed down in the form of place names and in the more or less apt remarks flowing from the lips of our jovial guide, struck me forcibly. Many of his remarks were naïve, even far-fetched, but when people climb mountains or explore caves, the usual

conventions are dropped and it is permissible to laugh at even a poor joke. I shall not relate the guide's stories; and such place names as Star Chamber, Gothic Avenue, Pillars of Hercules,



One can imagine something of the feelings of the explorer who, after crawling through a small hole some five hundred feet within the entrance of the Mammoth Cave, unexpectedly found himself within this enormous chamber, twenty-six to forty feet wide and three hundred feet long, with walls rising abruptly to a height of seventy-eight feet. A renewed sense of man's relative insignificance is borne in upon us as we enter the portals of "Vaughn's Dome." *Courtesy of John P. Morton & Company, Louisville*

conventions are dropped and it is permissible to laugh at even a poor joke. I shall not relate the guide's stories; and such place names as Star Chamber, Gothic Avenue, Pillars of Hercules,

Bunker Hill, Martha Washington's Statue, Snowball Room, Pineapple Bush, Corkscrew, Scotchman's Trap, Dog Hole, Giant's Coffin, Fat Man's Misery, Lover's Leap, and Mummy Niche, are all more or less suggestive and self-explanatory, at least on paper.

Of a less imaginative but more significant character to some of us are such features as Audubon Avenue, Rafinesque Hall, Putnam's Cabinet, Hovey's Cathedral, Jenny Lind's Armchair, Ole Bull's Concert Hall, and Booth's Amphitheater—the lists might be extended indefinitely.

There are other natural wonders in Kentucky. We have mentioned two rivers only; but probably no equivalent territory in the world is better served by navigable waterways. Perhaps the overland routes may have been correspondingly wanting; but the bison came into the country in late prehistoric times and many of his trails connecting river fords, saltlicks, springs, and open grasslands, have since served both the Indian and the white man as avenues of communication. The saltlicks are of especial interest. They are swampy places where salt exudes from the ground, and thousands of animals, representative of species both living and extinct, coming here to lick the earth, have been mired and their bones left secure for the future palæontologist.

Into this wonderland came the Indian long ago—we cannot yet say when or how or wherefrom. He lived in the caverns and on the hilltops, he erected mounds and villages, he cultivated the soil, and he burnt thousands of square miles of the natural forest, turning it into grassland to entice the buffalo; and then—after a time—he seems to have gone away again. The reason for his departure is something of a mystery; but, judging from the accounts of Spanish, French, and English explorers during the century preceding the American Revolution, the heart of Kentucky was



Among the most interesting discoveries of Indian relics in the Kentucky caverns were a number of neatly braided sandals found in Salts Cave in 1893. Some are made of the fiber of the cat-tail, others are woven of the inner bark of trees, and still others of wild hemp. They display several distinct forms of braiding as well as occasional ornamental tassels. Other interesting finds in the caves are half-burnt torches made of bundles of cane, stone pestles and axes, bone awls, implements of shell, and parts of gourd vessels. *Courtesy of John P. Morton & Company, Louisville*

uninhabited during all this time. The Shawnee were found living in force along the Ohio, the Cherokee were at home directly on the south and southeast, and the Chickasaw held the country to the west and southwest, near the Mississippi. These and other tribes are understood to have made hunting excursions into the abandoned country, and war parties also probably met here at times, for traditions speak of the territory as the "dark and bloody ground." In other words, it was border country or "no man's land," and to whom it originally belonged is uncertain. The tribes mentioned all seem to have claimed it, because—if history is to be believed—they sold their rights to the white man no fewer than five different times, receiving considerable sums of money in at least three of the transactions.

This singular fact of the uninhabited condition of Kentucky, together with her geographical position directly fronting the main gateway through the Alleghenies—the Cumberland Gap—gives the state very great historical importance in the winning of the West for the American Union. Kentucky herself has been called "the child of Virginia" and as such was colonized by people of English and Scotch ancestry, the pure strains of which are still to be found in the mountain districts. Daniel Boone was one of the first to bring his family into the country, and the outpost Boonesborough, which he founded and commanded, was located on the Kentucky River directly above the caves visited by the American Museum Expedition. This happened about the year 1775, and a short time later, near the end of the American Revolution, the immigration of landless soldiers and young women, as well as of united families, became general.

One of the prime necessities of life for the early settlers in the far-away wilderness was gunpowder; and as the principal ingredient of this compound, saltpeter, was known to occur in the floor-earth of caves, it came about in a very natural way that Kentucky soon became world-renowned as the land of caverns. The Mammoth Cave is said to have been known as early as 1797, and in 1812 saltpeter or niter was being manufactured here on a large scale. Some would have it that the battle of New Orleans was won by powder from this cave. However this may be, saltpeter was in great demand and consequently caverns were being searched for. This soon resulted in the discovery of a considerable body of archaeological data in the subterranean chambers. Among other things several "mummies," or desiccated human bodies, were found, some, it is said, in the Mammoth Cave itself. These were accompanied by a great variety of well-preserved articles, such as garments of skin and of woven fabric, feathered mantles, feather headdresses, hats, and moccasins. Lively discussions were precipitated. People for the first time seem to have begun seriously to ask who the original inhabitants really were and when they came. It was generally concluded that these mummies were not Indian, and the theory that they represented some extinct Old World stock is not dead yet. But the discussion subsided after a while and was not renewed until the late Professor F. W. Putnam, of Harvard University, opened it again in 1870-75. Professor Putnam went to Kentucky as a young man to serve as naturalist on the State Geological Survey of that day, and while gathering faunistic material in the Green River caves, he was forcibly attracted by the evidence of



DETAIL OF THE ARCHAEOLOGIST'S WORK IN MAMMOTH CAVE

Section of camp refuse about one hundred feet within the entrance of the Mammoth Cave. Just below the artificially made floor (the boards mark its level) are three to four inches of modern debris, and under that about two and one half feet of a more or less stratified composition containing ashes, charcoal, animal bones, fresh-water shells, and occasional fragments of human bones. In places this kitchen refuse reached a depth of fully four feet, and as a rule some of the material had sifted down about two feet among the rocks on which the main deposit rested. It is from slow, detailed investigation of such deposits that the true history of the prehistoric man of the cave-
caves will finally be read

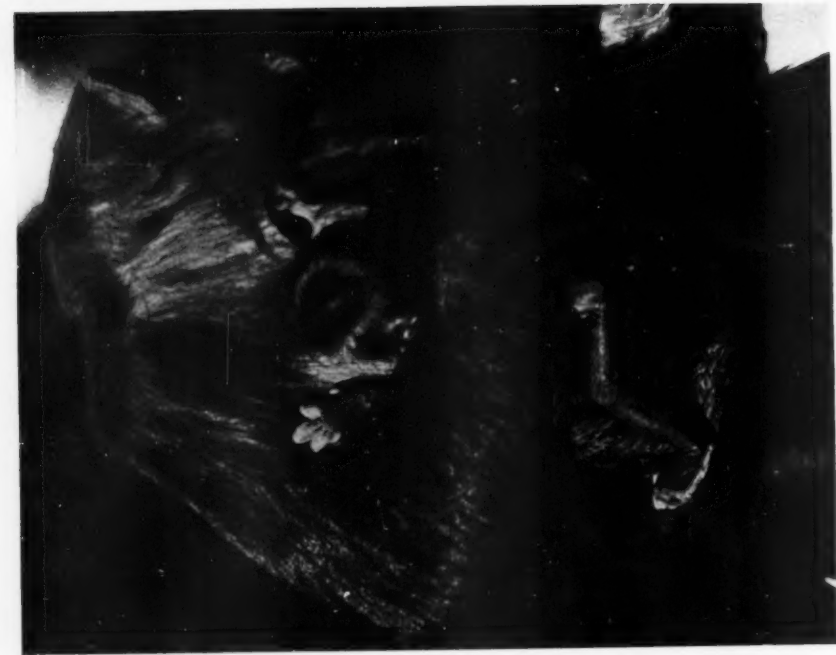
aboriginal visitation to this underworld. He did not himself carry archaeological investigation very far in the caves; but the contact, it seems, changed his life work. It is probably not far from the truth to say, that it made him the "father of American archaeology."

Whoever wanders into the black odorless depths of the Green River caves, will see evidence in plenty of the Indian's former presence. It is still somewhat doubtful just how Europe's men of the Old Stone age managed to scramble about in their underground retreats, but here are heaps of ashes where fires were built to light the way, and torches of cane lie around in many places. It is no easy matter to move about in the ordinary cave, and the question is commonly asked, "Why did the Indian attempt it?" The answer is not yet entirely clear. Perhaps he liked to explore, perhaps he held secret councils and ceremonies in the far interior, away from feminine eyes. Not being a creature of nocturnal habits, and, besides, not lacking in practical sense, he has never been found to have lived permanently in places of inky darkness, although he may have retreated to them at times. All we know is that he did quite commonly bury his dead in the interior of caves, and to this fact we owe much of our knowledge concerning him.

There is, however, a much more practical reason for the Indian's exploration of Kentucky's underworld. For a time it seemed merely a curious fact that immense quantities of flint were strewn for a hundred yards or more about the entrances to several of

the great caves. Some of the pieces showed evidence of chipping, but the greater number were simply rejected flakes. Finally, just before our expedition left the Mammoth Cave, it was ascertained positively that the Indian had quarried flint in some of the small far-away passages where nodules of excellent quality of this substance projected from the limestone walls. The projecting portions of the nodules had been struck off in most instances, and among the fragments which littered the floor were found two specimens showing unmistakable evidence of having been shaped by human hands. This seems the most illuminating fact yet discovered, because it explains without the possibility of doubt one reason why the Indian came into the caverns to explore. Flint was as necessary to him as saltpeter was to the white man.

Another new discovery in the Mammoth Cave was the fact that the Indian had lived probably for a long period of time directly inside the entrance, within reach of daylight. The camp refuse found there had attained a depth of more than four feet in places and was made up of ashes, animal bones, and fresh-water shells, as well as of articles of bone, stone, and shell. The chief feature of interest about these remains is that they seem to point to a people who lived entirely by hunting, whereas the aborigines of late prehistoric times all over the Ohio Basin were, at least in part, agriculturists. The Museum's investigation is not yet finished. We hope it may continue, and that it will soon lead to a clearer understanding of the Mississippi Valley Indian and his history.



THE ONLY AUTHENTIC HOME-BRED ANTHROPOID APE

Anuma is the daughter of Jimmie and Cucusa, Cuban chimpanzees. Anthropoid apes are highly different from one another in temperament. This is as we should expect from their resemblance to the human race, although as far as study and experiment have been able to bring out, there is no significant difference in degree of individuality even between earthworm and man, or ant and monkey. *Indebtedness for these photographs is due to Señora Abreu*

Individuality, Temperament, and Genius in Animals

FROM SUCH RESEARCH WE LEARN TO APPRECIATE HUMAN INDIVIDUALITY, AND TO REALIZE THAT ANY FUTURE CONSCIOUS CONTROL OF HUMAN LIFE MUST COME THROUGH A STUDY OF THE CONDITIONS UNDER WHICH VARIED TYPES OF TEMPERAMENT WILL DEVELOP THE HIGHEST CHARACTER AND THE GREATEST GENIUS

By ROBERT M. YERKES¹ and ADA W. YERKES

EXPERIMENTAL studies of animal behavior, pursued for the solution of definite problems of sense, instinct, or habit, frequently yield as by-products interesting and important information concerning individual, sex, species, and race differences. Such observations commonly fail to get recorded because of the primary importance to the observer of the problem on which his attention is focused. In preparing his results for publication he would gladly report everything of significance, were it not that exigencies of time and space render this either impracticable or impossible. It is largely because of our conviction that certain of the unrecorded by-products of our investigations are in various respects more important than the data which we have published, that we are attempting to write on evidences of individuality in various organisms.

In this field of naturalistic and experimental observation, there is always the risk of confusing age, sex, or race differences with those which are truly individual. The casual observer readily overlooks the fact that his pet canaries, kittens, or dogs, differ by several weeks in age or are otherwise not suitable for comparison, for as a natu-

ralist he is less concerned with strict comparability than with that knowledge which will lead to sympathetic insight. But to those who are trained in critical and well-controlled observation, it is an easy task to eliminate such sources of error and to obtain fairly comparable data concerning individuality. Field naturalists and the born lovers of animals know by intimate acquaintance that important individual differences exist in many species of organism, but experimentalists are less generally aware of this fact, for their attention tends to be monopolized by problems of species characteristics and of general organic functions or reactive capacity.

Even in invertebrates individuality becomes conspicuous with familiarity. Among earthworms we have observed that specimens, comparable in all essential points and existing under the same conditions of observation, exhibit surprisingly different modes of response. Thus, one individual adapts itself to the demands of a situation, works smoothly, steadily—as it were willingly; another, slowly and haltingly meets the experimenter's requirements. Its tendency to do the wrong thing seemingly amounts to perversity or

¹ Dr. Robert M. Yerkes is assistant professor of comparative psychology at Harvard University, managing editor of the *Journal of Animal Behavior*, and editor of the *Animal Behavior Series*.

stubbornness. And so the observer gains the feeling that the two organisms are quite as different in reactive tendency as are two men.

It has often been remarked that the individuals of a human race with which one is unfamiliar look alike. This we always discover to be due to our failure to notice marked individual differences. As our familiarity with the type increases, these individual traits become increasingly obvious. Now precisely what is true in our experience with our fellow men is still more true of other types of organism. We note at first only the species or racial differences, or perhaps if they be equally conspicuous, certain age and sex differences, but as we continue to live with the organisms and to observe them carefully day by day, we come to appreciate those qualitative and quantitative peculiarities which constitute individuality. As far as we can see, there is no significant difference in degree of individuality between earthworm and man, ant and monkey.

Intimacy of relation with a wide range of organic types has served, among other things, to convince us that temperament, character, and genius are terms, which, like individuality, may be used quite as appropriately in connection with one type of organism as with another. We wish especially, in this paper, to report certain of our observations concerning these aspects of life. Temperament we have come to think of as the sum of fundamental, inborn reactive tendencies,—they are sometimes called primary instincts; character, as these same tendencies organized through environmental contact or experience into a complex and more or less highly adaptive system of behavior; genius, as exceptionally strong or well-marked temperamental traits of a

particular order. The conventional and ancient classification of temperaments according to strength and duration of response as choleric, melancholic, sanguine, and phlegmatic seems unduly simple in the light of our observations, for there are at least several important ingredients or constituents of temperament which apparently vary independently or in groups with respect to strength and duration of response, and possibly also in other important ways. We may not here further dwell upon definitions, but we shall hope to render these suggestions more significant by the facts which we have to record.

Some years ago we undertook a comparative study of two strains of albino rat, the one closely inbred for many generations, the other outbred. Save for this difference, the individuals of the strains were entirely comparable. We attempted by various experimental means to discover peculiarities of behavior in these animals. Soon it became apparent that the inbred individuals adapted themselves less readily to new environmental demands. They proved less apt pupils in tests of habit formation. We were struck, as our observations progressed, by certain peculiarities of behavior which appeared to be characteristic of the strains rather than of individuals. Among them, fear, timidity, savageness, curiosity, sociability were conspicuous. In general, the inbred rats seemed more timid, fearful, more likely to defend themselves by biting if disturbed, less ready to try new things, more suspicious of the experimenter, slower to acquire obviously profitable modes of response than were the outbred animals. These differences in behavior seemed to us to account for an apparent difference in intelligence, and we finally concluded that it is really quite beside the mark

to contrast the two strains by saying that the one is the more or the less intelligent.

Subsequently, increasingly definite and well-controlled studies were made, in which were recorded observations concerning the preferred position of an individual in its cage or nest box; the relative positions at different hours of the two individuals, male and female, in a given cage; the degree or amount of activity; savageness, or the tendency to bite; and the quickness and amount of response to various stimuli. These and similar observations shortly indicated that savageness designates certain tendencies to reaction, as does also fear, timidity, or wildness, and that our only intelligible way of defining these terms is by enumerating the several types of activity. Wildness, for example, is indicated by attempts to hide in the cage or in the observer's hand, random and excited running about with repeated attempts to escape, squeaking, and various other forms of response. Timidity, which seemingly is not identical with wildness or fear, involves the avoidance of the experimenter, a kind of chattering or gnashing of the teeth, cowering, or even trembling.

Although most of our studies have been concerned with relations of behavior to inbreeding or to the crossing of individuals which differ markedly in some trait, we have incidentally obtained abundant evidence of important individual differences of the temperamental sort.¹ One rat, for example, is

extremely fearful of anything new or unusual, it shrinks timidly from the experimenter. It can only with difficulty be induced to try to find its way through the experimental apparatus. When cornered, it defends itself by biting the experimenter's hand. Its wildness is indicated by persistent efforts to hide or to escape. It responds quickly and markedly to any sudden and unexpected stimulus; peculiarly startling stimuli at times cause it to tremble. Another individual of the same age and sex, born in the same litter, is by contrast aggressive and exhibits marked initiative in new situations. Its fear or timidity is readily overcome by its curiosity. It quickly becomes accustomed to the experimenter, and allows him to touch it or take it up in his hand without attempting to bite, and shortly without effort to escape. It responds slowly and only slightly to most stimuli and is disturbed only by strong stimulation. In a word, the two rats are temperamentally as different as any two human beings one is likely to meet. It is such observations as these, made on many different individuals, that have wholly convinced us of the desirability of a careful analysis of temperament and the reduction to terms of measured description of its chief constituents.

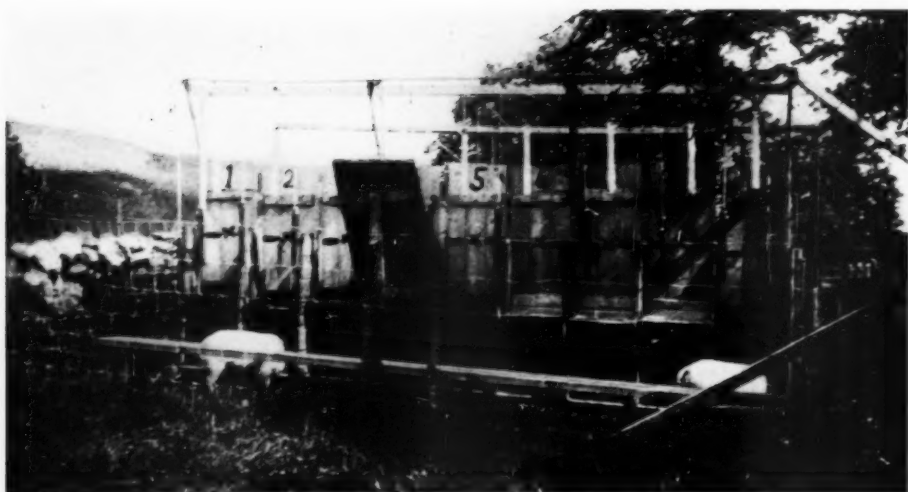
We once undertook to study experimentally the ideational behavior of pigs. For this purpose two young animals were chosen, the one a male, the other a female. They were observed daily, and for several hours each day, the whole of one summer. We became sufficiently well acquainted with their characteristics to appreciate alike their varying degrees of intelligence and their temperamental peculiarities. What we have not published in our report on the behavior of these creatures

¹ Basset, G. C. Habit Formation in a Strain of Albino Rats of Less than Normal Brain Weight. *Behavior Monographs*, 1914: 2: Serial No. 9.

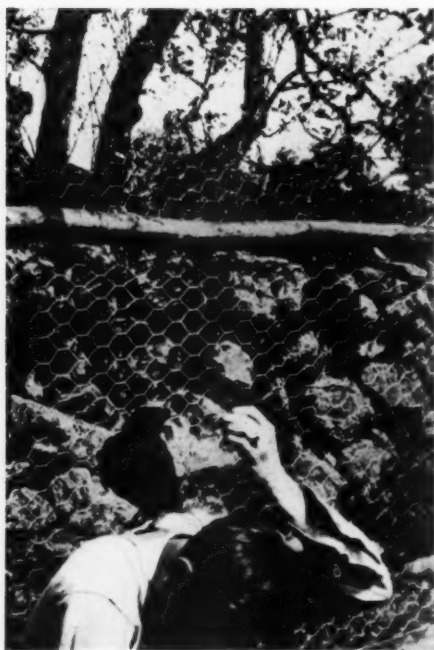
Yerkes, Robert M. The Heredity of Savageness and Wildness in Rats. *Journal of Animal Behavior*, 1913: 3: 286-296.

Yerkes, Ada W. Comparison of the Behavior of Stock and Inbred Albino Rats. *Journal of Animal Behavior*, 1916: 6: 267-296.

Utsurikawa, Nenozo. Temperamental Differences Between Outbred and Inbred Strains of the Albino Rat. *Journal of Animal Behavior*, 1917: 2: 111-129.



Nip and Tuck being fed as a reward for faithful service in an experiment. These two pigs were observed for several hours each day throughout one summer. Nip was less active than his sister Tuck, and also less greedy, but both worked remarkably well on their ideational problems under the spur of hunger, and their success justified the impression that the pig is one of the more intelligent mammals



At the left is shown Jim Crow in his favorite feeding place; at the right our carnivorous pet is evincing his marked preference for attached morsels. One summer we removed a brood of young crows from the nest and reared them by hand. They thrived mightily and soon became very tame, showing marked temperamental differences; in fact, the four specimens were as different in temperament as are the children of any household

certainly would interest the general reader much more than our printed contribution toward the solution of our problem.¹ We therefore venture to present certain of the fascinating by-products of our summer's work. That the differences which we are about to emphasize are not necessarily individual, we readily admit; that they are not age or species differences, we are certain. We suspect that some, at least, are sex differences.

Nip and Tuck, for thus we early decided to designate our subjects, soon made us feel their individuality. Both, under the spur of the hunger motive, worked remarkably well toward the solution of ideational problems, and their success in this work fully justified the popular impression that the pig is one of the more intelligent among mammals. Nip, the male, was less active and energetic than his sister, Tuck. He also was less greedy, and showed rather less initiative and a more limited range of reactions. Tuck it was who usually led if there was opportunity for competition, while Nip followed. Both quickly became accustomed to the experiment, but Nip showed more persistent wariness, timidity, and suspicion than did Tuck. She, however, was much quicker in response, more alert, curious, and quick to discover new opportunities for pig satisfaction. When at work on experimental problems, Nip was much more easily discouraged and tended earlier than Tuck to give up his search for the reward of success. Tuck constantly acquired new and profitable tricks, which as a rule sooner or later appeared in Nip also, sometimes spontaneously and again by reason of the imitative tendency.

As day after day we observed these two specimens of a mammalian type whose life under domestication gives its intelligence slight opportunity for display, we were strongly impressed, as we had been in the case of rats also, by the importance of temperamental reactive tendencies in responses to any experimentally arranged situation. The experimenter who ignores individuality or temperament in his subjects runs a grave risk of misunderstanding or wrongly evaluating his results. Our descriptions sound anthropomorphic, but that, the alert reader will appreciate, is due to our avoidance of stilted and unnatural terminology. We are attempting to describe in an intelligible way, and briefly, behavior which, if we should restrict ourselves to wholly objective terms, would require pages of unusual behavioristic statement.

Among the birds, there is probably no more interesting object of study than the crow. Its species characteristics are notably alluring to the psychologist, but to us, as a result of varied observations in the corn fields of Pennsylvania and on the wooded hills of New Hampshire, sex, age, and individual differences are no less fascinating. One summer we removed a brood of four young crows from their nest just before they were able to fly. We could not identify the sexes at the time, so the differences we observed may be either sex or individual, but at any rate, the four specimens were as sharply contrasted in temperament as are the children of any household.

We set about rearing these birds by hand, the while taming them for experimental purposes. Within a few days, one of the four began to exhibit the characteristic fear reaction of its species, and at once it became extremely difficult to feed. For a few days we

¹ Yerkes, Robert M., and Coburn, Charles A. A Study of the Behavior of the Pig, *Sus scrofa*, by the Multiple-Choice Method. *Journal of Animal Behavior*, 1915: 5: 185-225.

persisted in our attempts, and then as he or she, as the case may have been, was no less persistent, we decided to devote our time and energies to his three companions. Thus, at the very outset, temperamental peculiarities, perhaps amounting to nothing more than exceptionally strong and persistent fear reactions, served to eliminate one of the individuals from our collection.

Our space will not permit us to recite in detail, as we are tempted to do, the peculiarities which these birds exhibited during a memorable summer. We must content ourselves with the simple statement that in reactions which may be designated as those of wildness, fear, timidity, curiosity, suspicion, initiative, sociability, the individuals differed most obviously and importantly. We hope sometime, in justice to the problem of crow temperament, to devote a summer to the intensive study of sex and individual differences in these extremely intelligent birds.¹

Concerning temperament, character, and genius in the Primates, our materials are at once abundant and to us absorbing. Every one who knows anything about Primates, high or low, realizes that in them individuality is more conspicuous for the human observer than in most other organisms. But our results do not justify the conclusion that temperamental differences are more obvious or more important in monkeys, anthropoid apes, or man, than in crows, pigs, or rats. We have come to suspect that the popular opinion concerning the matter is due chiefly to similarity of structure and behavior

—in a word, to felt kinship. It is simply because we are more like monkeys and apes that we more readily notice and more highly value their individual characteristics.

Not so very long ago, we had a splendid opportunity to become intimately acquainted with two adult male monkeys of the species *Pithecus irus*. The one, we shall call Skirrl; the other, Jimmie. It would be easier to tell what these individuals had in common than to enumerate their differences. Their temperamental divergences constantly amazed us. But here we must content ourselves with an account of a few of the most remarkable differences in behavior.

Skirrl's attitude toward the friendly experimenter was frankly aggressive, but not vicious. Jimmie was extremely vicious; he never could be trusted. Skirrl's interest in objects which he could play with or in any wise manipulate proved inexhaustible, whereas Jimmie exhibited slight interest in other objects than the members of his species, his enemies, or foods. By a competent observer who had studied him carefully prior to our acquaintance, we were told that Skirrl was feeble-minded. And it certainly seemed so, when, as frequently happened, he sat before an experiment box, yawning repeatedly, and from time to time interrupting these expressions of ennui by half-hearted attempts to solve his problem. Whereas Skirrl rather quickly became accustomed to unusual experimental situations, Jimmie was so wary and distrustful that we finally gave up our attempts to observe his behavior under rigidly controlled conditions, and treated him merely as a visitor in the laboratory.

One day we noticed Skirrl pounding with a stick a nail which he had found in his cage. We were quick to follow

¹ Coburn, Charles A. The Behavior of the Crow, *Corvus Americanus*, Aud. *Journal of Animal Behavior*, 1914: 4: 185-201.

Coburn, Charles A., and Yerkes, Robert M. A Study of the Behavior of the Crow, *Corvus Americanus*, Aud., by the Multiple-Choice Method. *Journal of Animal Behavior*, 1915: 5: 75-114.



At the left, Skirrl sits pensively waiting for something to do. At the right, he is shown in one of his early attempts at sawing. Skirrl was studied in comparison with Jimmie, another adult male monkey of the same species (*Pithecius irus*). Jimmie, vicious and never to be trusted, showed no interest except in other monkeys, in his enemies, or food, whereas Skirrl was delighted with any object which he might put to some mechanical use. He used a saw in as many ways as might a boy of four or five years. He did not imitate the experimenter and learn to use it in the conventional manner, but preferred to work out his own methods. In the use of tools this monkey's behavior was so unusual and individual that it amounted to genius



One day Skirrl was noticed pounding a nail he had found in his cage. He was at once provided with hammer, nails, and a board, and soon his skill, without tuition, in driving the nail into the board more than equaled that of the unpracticed human being. Jimmie, on the other hand, would throw the hammer into one corner of his cage, scatter the nails about, and try to tear the board to pieces with his teeth. Observations of such extreme differences in individuality among animals are a spur to a more profound study of man, to the end that there may be formulated for the future a science of human behavior

this cue. The monkey was provided with a suitable hammer, nails, and a board. He went to work immediately, and although he exhibited no constructive ability, his skill, without tuition, in handling hammer and nails and in driving the latter into the board or elsewhere, according to his taste, more than equaled that of the unpracticed human. In the presence of the same outfit of tools, Jimmie threw the hammer into one corner of his cage, scattered the nails about the floor, and proceeded to tear the board to pieces with his teeth. Never did he exhibit the least inclination to use hammer and nails independently or together as tools or implements.

When given a saw, rendered indestructible by metallic guards for the handle, and a heavy wooden block on which the saw might be used, Skirrl was manifestly pleased. He used the saw in quite as many and varied ways as might a boy of four or five years. By sawing before him at various times, the observer tried to teach him to use it in the conventional human way. But to this he paid scant attention, preferring, it seemed, to work out his own modes of amusement. Finally, he hit upon a way of using the saw which we have been told is in vogue among certain peoples of the East. Sitting on the floor, he held it, teeth uppermost, his feet grasping the handle tightly and holding the saw firmly in position. He then grasped a nail by both ends and rubbed it rapidly over the teeth of the saw, thus producing a noise which evidently delighted his soul.

It is clear enough from the responses of other monkeys of the same and opposite sex (the same and other species) to saw, hammer, and nails, as well as to other implements, that Skirrl's behavior must be described as highly indi-

vidual or temperamental. Never have we observed anything comparable with it in any untaught Primate other than the human. We have agreed to call Skirrl's behavior an expression of genius, for the more we consider the matter the more certain we feel that this particular individual possesses remarkably strong tendencies to react to certain objects as tools or mechanical devices. From our point of view, he possesses an unusual type of interest or the same to an unusual degree. Feeble-minded though he may be as far as most intellectual requirements are concerned, he is a genius in mechanical manipulation, and to him we feel indebted for a new point of view and for new insight into the meaning of genius.

The anthropoid apes are so manlike in appearance and behavior that we should be surprised were they not highly individualized and possessed of temperamental traits as well as forms of genius strikingly similar to our own. Our opportunities for intimate acquaintance with the higher apes have been disappointingly few, but with one young orang-utan whom we knew as Julius, we came into delightfully friendly relations. Julius was not born in captivity—few anthropoid apes have that advantage, or disadvantage—but he was captured young, and when we knew him in California, he was probably not far from five years old. Already we have recorded in print many interesting features of his behavior, as well as our strong conviction of the supreme importance to science and to other aspects of civilization of the thorough study of the anthropoid apes.¹

Julius one day was resting placidly

¹ Yerkes, Robert M. Provision for the Study of Monkeys and Apes. *Science*, 1916 N. S., 43: 231-234.

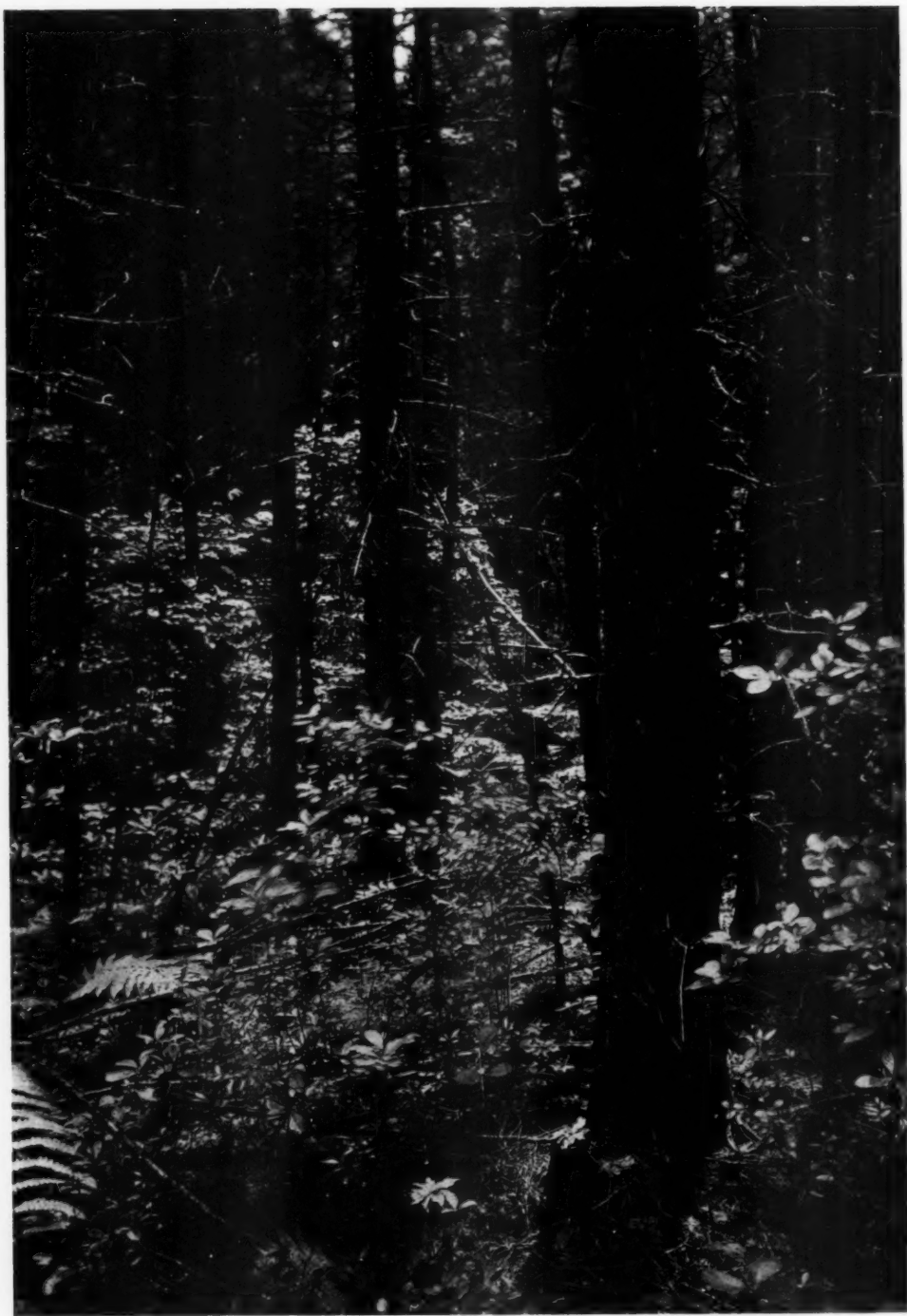
Yerkes, Robert M. The Mental Life of Monkeys and Apes: a Study of Ideational Behavior. *Behavior Monographs*, 1916: 3: Serial No. 12.

in his good-sized cage. A workman passing the cage stopped and offered him a banana. He hurried over to get the proffered food, but just as he reached out his hand for it, the man unkindly drew it away and started to walk off. Julius, evidently disappointed and seemingly resentful, turned, and by a series of somersaults rapidly rolled the whole length of his cage. Later, the same sort of behavior was observed in quite different situations. When, for instance, after working persistently to solve an experimental problem, he failed to obtain the desired reward of food, Julius would bring his head to the floor with a thump and turn a few somersaults. In thus expressing his feelings of disappointment and resentment, he seemed to relieve himself, for afterward he would go to work, sometimes with energy and a fair show of cheerfulness. It may be remarked, by the way, that similar modes of response have been observed in children of two to six years of age. We recall an instance in which a little boy who for some time had been working unsuccessfully on an ideational problem bumped his head several times, carefully it is true, against a wooden partition, and then remarked, by way of explanation, that he wished to stir things up.

When threatened with punishment or actually punished, and when out of sorts or ill, the young orang-utan behaved so like a child of two or three years that he caused the observers to feel uncomfortably sympathetic. Many aspects of his behavior, which unhappily we may not now stop to describe, reminded us of our observations of children, and we found ourselves involuntarily comparing him with human subjects.

How surprising it is, as one stops to reflect on this matter of temperament, that in the same household, as children of the same parents, we find individuals who seem to be opposites in the most varied respects. The one child is sympathetic; the other tends to be cold, unresponsive, or even cruel. The one is frank, naturally honest; the other sly, secretive, and unreliable. The one kindly, good-natured; the other sour and resentful. As these children develop, their temperamental traits may be molded perhaps by educational influences into equally valuable types of character. But never by any chance can they come to possess similar temperamental characteristics.

Surely we shall do well to observe diligently and develop means of studying carefully and measuring the various constituents of temperament, and the factors which enter into character. We should study the constitution and varieties of genius, and especially the conditions which, as experience, operate upon temperamental traits to develop the responses of genius and to elaborate character. For in our efforts to control and direct human life knowledge of these aspects of individuality is of fundamental importance, and there are to-day unmistakable indications that the future will require of us a science of human behavior which shall consider as carefully the individual as the species. We live in the era of the biological sciences, and we look forward to an unprecedented development of the sciences of organic function, and especially of those which, like physiology, psychology, and sociology, attempt to inform us concerning phenomena of behavior. These sciences promise to become of supreme importance to civilization.



A CEDAR SWAMP AT SHAMONG, NEW JERSEY

The cedar swamp forms a picturesque part of the vegetation of South Jersey. The trees (*Chamaecyparis thyoides*) are evergreen and their dense growth forms a shelter, cool in summer and warm in winter, for many wild birds and animals. Growing in the sphagnum moss beneath the cedars are shade-loving plants, such as the sumac, red maple, pepper bush, bayberry, blueberry, the cinnamon fern, and delicate star flower (Photograph taken in late June)



An old colonial sawmill, in continuous use since 1750. When the early settlers were driven by force of numbers from the alluvial river bottoms to the more barren pine lands, a new industry sprang into existence. Sawmills, driven by water power, were in operation as early as 1700

The New Jersey Pine Barrens¹

By JOHN W. HARSHBERGER

Professor of Botany, University of Pennsylvania

EDITORIAL NOTE.—It would be well if New Jersey could set aside a portion, at least, of the Pine Barrens as a state reserve. Although the question of reservation has been agitated by interested botanists and ornithologists, at various times, the state has as yet taken no definite step in the direction of protection. The Pine Barrens have been likened to a transported bit of the South, and they have long had a reputation as a place where rare wild flowers might be found. Conditions are changing, however, and in many parts today there is no longer any evidence of the primeval wilderness known to Audubon, to Baird, and even to Witmer Stone in 1901 and later. And what pine woods are left are being destroyed, both by fire and by the axe. All the cedars are being cut for lumber, exposing also the delicate plants of the forest swamp to wind and sun and consequent destruction. Choice bog orchids and other species are killed by the artificial flooding of cranberry marshes. The Pine Barrens have suffered besides from proximity to New York and Philadelphia; mistletoe has been completely killed out and little holly remains; the land has been robbed that its laurel might grace suburban estates; sweet bay unfortunately has a large market value; trailing arbutus and pyxie are rooted out to sell on city streets. The sphagnum even is raked from the swamps to be used as packing by city florists. In the meantime automobile roads are penetrating farther and farther into the parts still untouched; while railroads with new towns and their surrounding areas of cultivation, added to the other causes of destruction, are slowly but surely putting an end to New Jersey's primeval coniferous forests and to her choice wild flowers. Is America still so young and so prodigal that in a case like this she cannot see and act before scourged by loss of her natural treasure?

WHEN that part of New Jersey known as the "Pine Barrens" was first settled, and before roads and clearings were made in the primeval forest, the pioneers inhabited the country along the

large streams, notably along the Delaware River where the alluvial soil was rich and productive. After all the available land along the river banks had been patented, the early settlers were forced to utilize the wilderness to

¹ The illustrations are from photographs by Messrs. Henry Troth and J. W. Harshberger

the eastward. As the population became denser, it encroached more and more upon the land covered with the pitch pine, and as the soil of this region was less productive, and in many cases poor, the settlers began to look upon it as barren, hence the epithet "Pine Barrens."

The influence that this barren pine land had on the inhabitants of the region was soon seen in the local industries. Throughout the "pines," the sawmills, driven by water power, heralded the advent of permanent settlement. These mills were erected first in the period 1700-25. The pitch pine is the tree which gives character to the Pine Barrens of southern New Jersey, and with it is sometimes associated the yellow pine. The pitch pine satisfied the needs of the settlers for the sills and beams of buildings. As compared with modern logging, the methods of cutting and handling the logs in the forest were simple. Horse and ox-teams sufficed to transport the logs to the sawmill. As the country was level and flat, no insuperable difficulties were presented in getting the logs out of the woods, especially if the lumbering was done when the ground was frozen or covered with snow. Also turpentine, resin, tar, and charcoal were obtained from the pitch pine tree. Fat pine knots were used as a substitute for lamps and candles in the early days by splitting the knots into thin splints. The white cedar of the swamps yielded a fine grade of lumber for vats, tanks, churns, buckets, and firkins. Shingles were made from white cedar, and these shingles covered many of the houses built in New Jersey in the last century. Aside from the forests, an important industry arose in southern New Jersey through the cultivation of the native cranberry, for which a large

demand has developed in the United States.

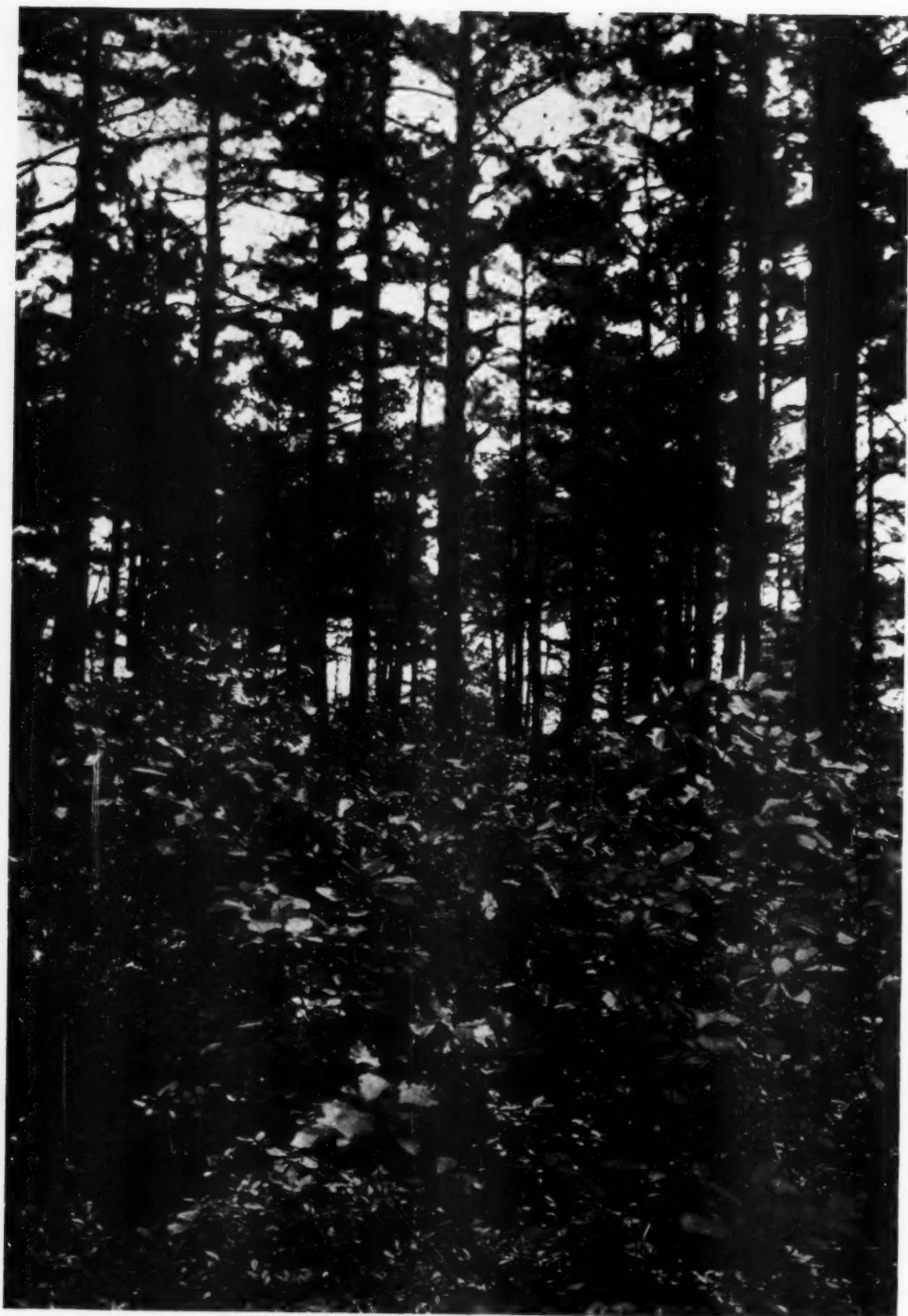
There are several types of pine barren vegetation:¹ the pine forest proper, the cedar swamp vegetation, the deciduous swamps, the savannahs, the bogs, and the plains. The tree which makes up the bulk of the New Jersey pine forest is the pitch pine. In old stands of pine the average height of trees from ten to fourteen inches in diameter is about fifty feet. Where fire has destroyed the original forest, the pine trees are stunted and reach only a height of about twenty feet. The undergrowth in the pine forest consists of several species of dwarf oaks, the sassafras, sweet ferns, blueberries, huckleberries, sand myrtles, and laurels. The tall herbs are goat's-rue, lupine, wild indigo, and various grasses. The plants of the forest floor are bearberry, trailing arbutus, wintergreen, and pyxie. As the plants of the heath family, such as the laurels, huckleberries, and blueberries, form numerically the largest part of the undergrowth, the pine barren forest forms what the European plant geographies call a "pine heath," and this comparison of American with European vegetation is heightened in a study of the plains of the central part of the state, for here are hills covered with forests of dwarf—"elfin," or "pigmy"—pitch pines and oaks, with laurel, and other shrubs. These plants owe their dwarfed condition to a hard-

¹ The history of the New Jersey pine barren region begins with the formation of the marginal plain known as the "pre-Pensauken peneplain," covered with a fairly uniform vegetation. With the beginning of the Pleistocene, part of the Atlantic coastal plain was depressed, but an island, representing the Beacon Hill formation, remained covered by the remnant of the ancient coastal plain vegetation. Pensauken Island was separated from the mainland by Pensauken Sound, and when the land emerged again, the pine barren vegetation occupied an area coincident with the outline of Pensauken Island, retaining these boundaries up to the present, as a new vegetation surrounded that of the Pine Barrens.



A PICTURESQUE BEACH AT SOMERS POINT

No more inviting region in its primal conditions lies so accessible to large centers of population such as New York and Philadelphia. The dense forest on the bluff with its undergrowth of holly, red cedar, and post oak blends with the vegetation of the beach—goldenrod and broomlike panic grass (*Panicum virgatum*) (Photograph made in April)



A STAND OF PITCH PINE

The pitch pine (*Pinus rigida*) grew originally from forty to seventy-five feet tall in the primeval forest, but owing to frequent forest fires it is now rare to find trees as tall as fifty feet. The wood is used for building and cabinet purposes; in olden days torches, made from the fat pine knots, were used as substitutes for lamps and candles. As a lower story of growth in this particular forest at Shamong we find several species of oak, the huckleberry, blueberry, inkberry, sassafras, and common brake

pan several feet below the surface. This corresponds to the Ortstein found in German heathland, where similarly the trees are dwarfed because the tap roots are unable to penetrate this strongly impervious layer of soil. The trees reach a certain size, then die back, to be replaced later by seedlings which go through the same course of development. Occasionally, where the hardpan is not continuous, a few taller pine trees are found. On the plains of New Jersey, the dwarf pitch pines assume a basket-like form and so does the broom crowberry (*Corema Conradii*), a plant found nowhere else in the state.¹

In the seasonal aspects of the Pine Barrens we miss the familiar spring flowers, such as the wood anemones, spring beauties, bloodroots, rue anemones, violets, and hepaticas, which in deciduous forests flower before the leaves of the trees appear. In the Pine Barrens, the dark green color of the prevailing pines is enlivened in the spring only by the light greens of the developing oaks and deciduous shrubs. Autumn, however, is sometimes a riot of color—as it was last October.

The cedar swamps form an important part of the vegetation of South Jersey, and also a noticeable feature, because the sky line is everywhere cut by the spire-shaped tops of the trees. The white cedar trees (*Chamaecyparis*

thyoides) are evergreen, and grow so closely together that they form a dense shade in which only the most shade-loving plants will grow. Three facts are noteworthy about a cedar swamp. In the first place, a white cedar forest is protective, as far as the movements of air are concerned. The wind may be blowing hard outside, but within the cedar grove all is calm and still, so that the few deciduous trees there may hold their leaves until the advent of spring. Secondly, a cedar swamp in summer is cooler than the surrounding pine forest, on account of the dense shade and the evaporation of water from the bog moss, or sphagnum, which holds the water as a sponge and gives it off during the hot weather. Thirdly, a cedar swamp in winter is warmer than the adjoining pine forest through which the wintry winds can blow, and thus, during the inclement periods of the year, the cedar grove forms a covert for many birds and wild animals. Associated with the white cedar and capable of growing in the shade are red maple, magnolia, sour gum, laurel, swamp azalea, leatherleaf, sweet pepper bush, and high-bush blueberries. In some cedar groves we find the curly grass fern (*Schizaea pusilla*).

The deciduous swamps which are found along the slow-moving streams may have succeeded white cedar swamps on the removal of the valuable evergreen trees for lumber, and the trees and shrubs of such swamps are those which, held in subjection beneath the shade of the cedar trees, have sprung to maturity with the stimulus of the increased sunlight. Many times, however, the deciduous swamp has been in undisturbed possession of a stream valley from time immemorial. Open pools in the swampy areas are covered with white water lilies, golden clubs,

¹ The region, outside of its botanic aspects, presents much of interest. A study of the place names shows that the white cedar tree has been used in designating a number of geographic features, as: Cedar Brook and Cedar Grove. Next to the cedar, the white oak has been used, as in White Oak Bottom and White Oak Branch. Indian names linger in Manahawkin, Manumuskin, and Shamong. A number of geographic features are designated by well-known articles of human use. Such are Apple Pie Hill, Bread and Cheese Run, Breeches Branch, Cabin Branch, Calico, Featherbed Brook, One Hundred Dollar Bridge; and some have a personal flavor, as Comical Corner, Double Trouble, Friendship Bog, Good Luck, Hospitality Branch, Mary Ann Furnace, Mount Misery, and the like. Among the names are many recognized as exotic in origin, such as Chatsworth, Chesilhurst, Lakehurst, and Penbryn.



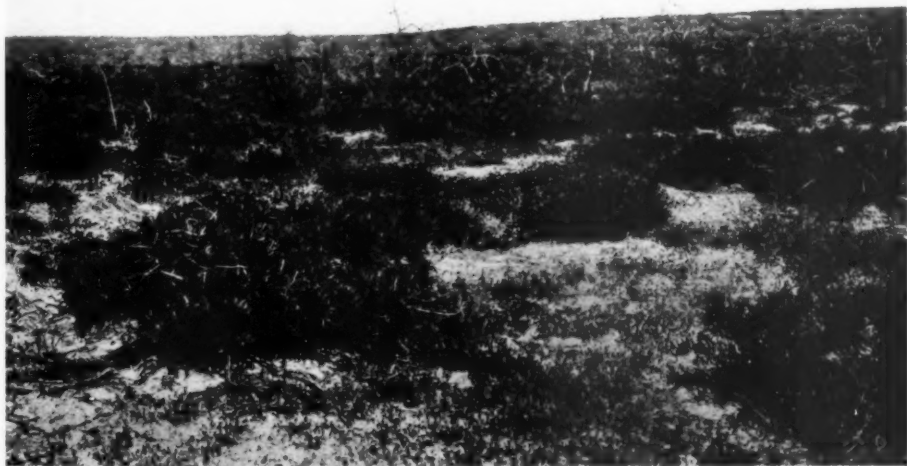
Where the pine forest reaches a projecting arm into the salt marsh at Somers Point—fronted by a strip of switch grass



In the heart of the Pine Barrens, on the south bank of the Wading River, are the typical New Jersey savannahs, wet grassy lands dotted with groups of pine and of white cedar trees. The photograph was made in late May and shows the tall umbrella-like flowers of the pitcher plant rising above the swamp grasses



Leaves of the pitcher plant photographed in March where they were growing on the ground in the dense velvet of sphagnum moss in a cedar swamp. The yellowish green leaves are pitchers handsomely veined with crimson



On the lower plain, patches of broom crowberry (*Corema Conradii*) mingle with low pine trees and dwarf oaks. Reindeer lichen and flowering moss carpet the ground

and spatter-docks, while at the edges grow cinnamon and royal ferns, pitcher plants, sundews, and bladderworts.

True savannahs similar to those of the southern states are found in the pine barren region, as along some branches of Wading River. These are usually terraced, presenting alternately a wet terrace and a dry terrace. Grasses and sedges with a few peculiar

and characteristic herbs cover these savannahs, which are distinguished by the growth of scattered pitch pine or white cedar trees. These are open, sunlit breaks in the monotonous forests of pine and white cedar.

The growing season in the Pine Barrens is between the last killing frost of spring and the first killing frost of autumn. At Vineland, according to

the records of the United States Weather Bureau, the average date of the last killing frost is April 19, and the latest recorded date in the spring is May 13. The average date of the first killing frost in autumn is October 19, the earliest recorded date October 2. If we take the average dates, the season of growth is exactly six months, or 183 days, in length. The culmination of the flowering season of pine barren plants is in August, when a larger percentage of plants is in bloom than at any other season of the year.

An examination of the underground systems of pine barren plants brings out some important principles of plant growth. The rainfall is sufficient during the year for the superficially rooted annuals and perennials, but there are critical periods when no rain falls, and then certain marvelous leaf structures, which control loss of water, become efficient. With the deep-rooted trees it is otherwise, for during the critical period of dry weather their deep root systems enable them to get a supply of

water from the subsoil. These considerations indicate that most of the pine barren plants have methods of enduring drought, or of evading or escaping it.¹

No more inviting region in its almost primeval conditions lies so accessible to the busy dwellers in our large centers of population, such as New York and Philadelphia. The region, having a salubrious climate, should attract the health and pleasure seekers, and the state of New Jersey should preserve intact large stretches of the forest so that the healthy and the sick, the wealthy and the poor, can derive benefit from the life-giving air of the pines.

¹ The soils of the pine barren region are sandy with a gravelly subsoil, and the rate of percolation of water through the layers of soil from different localities shows that water passes through beach or dune sand more quickly than through pine barren sand, and through pine barren sands more rapidly than through soils covered with a deciduous forest. Experiments on the water-holding capacity of these types of soils show that dune sand retains 33 per cent of water which falls as rain, the pine barren soils 45 per cent, and the deciduous forest soils 56 per cent. These matters are considered at some length in *The Vegetation of the New Jersey Pine Barrens*, by John W. Harshberger, published by Christopher Sower Company, Philadelphia, 1916.



This colonial log schoolhouse at Speedwell shows the style of old pine barren architecture and construction. Photograph used through the courtesy of Professor Herbert N. Morse

Creative Textile Art and the American Museum¹

By M. D. C. CRAWFORD

With two color plates presented to the JOURNAL by H. R. Mallinson & Co. and Johnson, Cowdin & Co., respectively

THE silk industry in America amounts to \$500,000,000 yearly. Ninety-seven per cent of the silks worn by American women are woven in the United States. It may also be added that the United States uses more raw silk than all of Europe combined. Thirty years ago the proportion of imports to exports was just reversed, and so within the business career of men still active, this industry has grown to its present enormous proportions.

Inspiring as these statements are for our industrial development, however, it must be said that the decorative ideas have been almost always foreign in origin. We looked to Europe for almost every suggestion of style in fabrics and in garments, until the necessity of the last two years compelled us to exert our own originality. The textile art was very much neglected in this country and, while it is unjust to the few men of original ideas, who did not wait for the spur of necessity, to say that there was no creation in America previous to the war, yet the statement requires only this qualification to be accurate.

This great industry during the past year has made extensive use of the American Museum collections. The cotton manufacturers are following this example, and before many weeks are past, this industry also will be indebted to the American Museum for decorative schemes. In New York City, besides the textile interests, there is an enormous investment of capital in the garment business. The number

of employees runs into the hundreds of thousands, and this is easily the best paid labor in the world. The volume of business in ready-to-wear garments that leaves Greater New York yearly runs close to the half billion mark—and this industry also is turning to the American Museum collections for artistic inspiration. But the silk men came first. Nor is the reason for this far to seek, since silk is a luxury and requires a continual succession of new and beautiful ideas in order to induce people to buy it.

While it is unquestionably true that the great collections of primitive American art have largely affected the present styles (and no one can be indifferent to the significance of the tardy appreciation of this wonderful material), yet the other great collections, such as the Chinese, Koryak, Philippine, and South Sea Island, have also been of great interest. Fashion seems to require almost constant change, and it may well be that the designers will at different times emphasize different collections in the Museum. But the addition to our decorative arts of the inspirational wealth of aboriginal American design will be of permanent value. We shall turn to it again and again, each time with added skill and appreciation. These records are so intimately, so unquestionably our own, that they will serve as a basis for our distinctive decorative arts, and will lend a virile character to all our future creative work.

¹ See previous article by Mr. Crawford, AMERICAN MUSEUM JOURNAL, Vol. XVI, page 417, which gives many illustrations of Peruvian and other original sources of design in the American Museum.

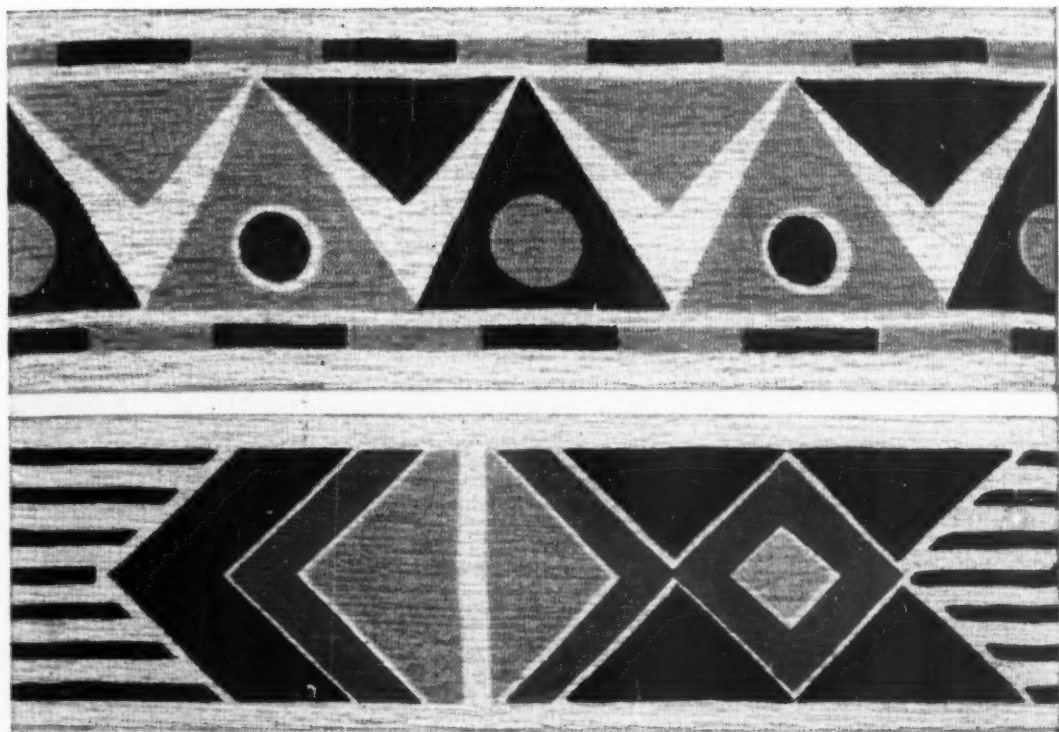
It is by the simple, everyday objects and materials which touch our lives that we receive, for good or ill, the message of art. It has been so in every nation that has created a truly great school, and it was eminently true of the aboriginal Americans. Their art touched every phase of their existence, and it is richest in its textile and costume expression. It will therefore be evident to the thoughtful that the aesthetic possibilities of beautiful tex-

tiles are almost limitless. That other arts today, such as interior decoration, will follow the tendency in our costumes, is a natural corollary. To see and to wear beautiful fabrics and costumes cannot fail to develop our artistic appreciation in other lines.

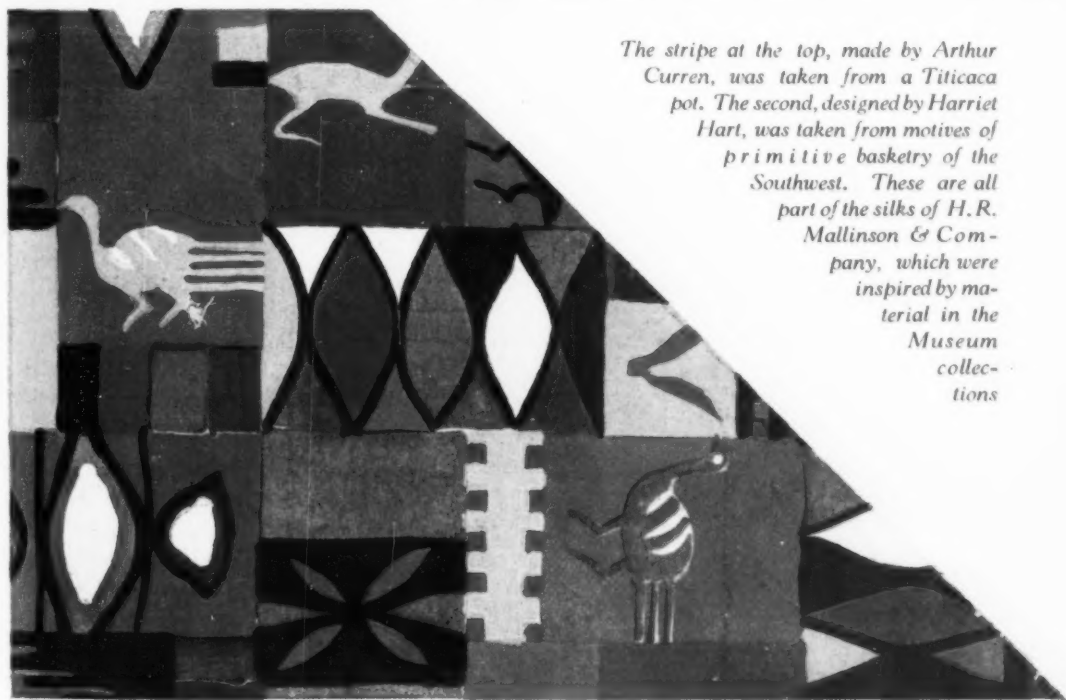
This movement will have a great effect on our export business, for it goes without saying that the wonderful war energies awakened in America during the last two years must find vent in the



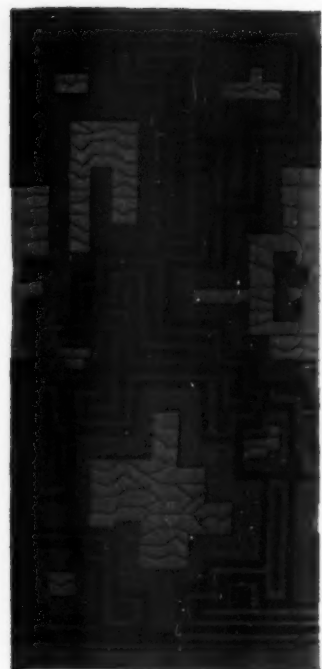
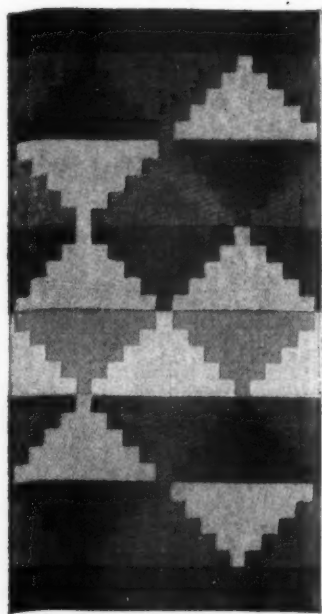
This design, which won second prize in the recent design contest, was suggested by the Indian collections in the American Museum. It was the first textile design ever made by the artist, Miss Ryther. The sample of silk incorporating it was furnished by Belding Brothers



The stripe at the top, made by Arthur Curren, was taken from a Titicaca pot. The second, designed by Harriet Hart, was taken from motives of primitive basketry of the Southwest. These are all part of the silks of H.R. Mallinson & Company, which were inspired by material in the Museum collections



This lower pattern, designed by Miss Ilonka Karasz, was inspired by Guatemala belts and girdles in the American Museum.



The designs of these ribbons were inspired by various collections in the American Museum. The Amur River and Koryak art is represented, as well as that of Peru and the Southwest. The designs were made by Mr. Emil Speck and the ribbons woven by Johnson, Cowdin & Co.

exports of peace, once the shipment of munitions ceases. It is essential to the success of a great part of this business that the product be typical of our artistic, as well as of our industrial development. If we are only copyists we can never be serious competitors.

Bringing the industry, the artist, and the American Museum into closer relation has been a personal campaign,¹ the actual details of which were divided among lecture courses, personal visits by the artists and the responsible men in the industry to the Museum, and by a design contest (conducted by *Women's Wear*), in which designs submitted from all over the country had to have museum material for inspiration. This design contest developed many artists who have since been successful in the industry, and through it first learned how to use a museum in their work.² During the last few months, Saturday afternoons have been given over to the technical instruction of an ever-increasing group of designers, who in this way become familiar not only with the problems of the industry, but also with the collections in our exhibition halls.

The first man to visit the Museum as a representative of the industry was Mr. E. Irving Hanson, of H. R. Malinson & Co. At the beginning of the campaign, Mr. Hanson visited the Peruvian collection in order to get some ideas for making his silks more beautiful. He was an immediate convert to the suggestion, and many of the designs on his famous Khaki-Kool fabric were inspired by the beautiful things he saw.

¹ In this movement I have been greatly aided by Mr. Albert Blum, treasurer of the United Piece Dye Works, and by the publicity circulated among the industry through the columns of *Women's Wear*.

² A list of names of these artists is kept open to the industry.

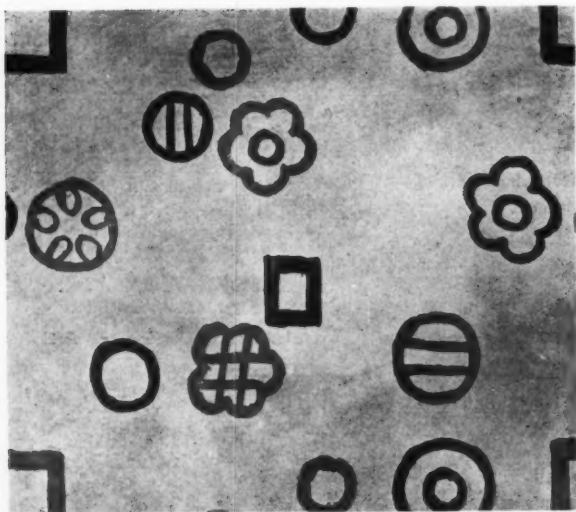
The visit that Johnson, Cowdin and Company's organization made to the Museum was typical of the proper way of approach: Mr. MacLaren, business manager, Mr. Jacobs, mill expert, and Mr. Emil Speck, designer, came together. Mr. MacLaren wished to determine whether the claims I had made



Striking designs inspired by the Peruvian and Koryak collections of the American Museum. The samples of heavy silk embodying them were furnished by Cheney Brothers

to him concerning these collections were based on fact; Mr. Jacobs came to see whether such ideas could be developed on the loom; Mr. Speck came to convert the documents he saw into modern designs. Mr. Speck was and is a constant visitor to the collections, and the beautiful ribbons shown in the color illustrations are the result of his research in the Museum and his skill as a designer. These concerns have made it possible for the American woman to portray in her costume the great arts of the New World.

A scarcely less constant visitor to the



The idea for the upper design, made by Mr. Makoto Nishimura, was taken from the American Museum's collections of primitive American art. Mr. Nishimura was a prize winner in the recent design contest. Samples of silk bearing this design and the following were furnished by Belding Brothers

The lower design shows a graceful motive suggested to the artist, Mr. Andrew Fleury, by the Museum's Amur River collections. The design won third prize in the contest

collections has been Mr. O. G. Fisher, of Belding Brothers, and he has been very much influenced in his designing by the material he has seen here. The same may be said of Cheney Brothers, who are making use of ideas developed from this material. It would be tedious

to enumerate each person who has come to the American Museum and found it a great commercial asset—as well as a delightful recreation. John Wanamaker's store recently had a very interesting exhibit of "Mayan Fabrics," the motives for which were taken from the Museum. These fabrics were exhibited in several other cities, even as far west as Portland, Oregon.

It would be impossible, within reasonable space limits, to show a tithe of the designs which have been created from this inspiration. Indeed, they are coming out so fast that it is impossible even to keep trace of them. The designers, working under the guidance of the Museum, are spreading this art so rapidly among the industry that many people are buying designs and do not realize that the ideas have been suggested by Museum material. As before stated, representatives of the cotton and garment concerns also are beginning to visit the Museum with serious intentions. Burton Bros. & Co.,

Wm. H. Brown Son & Co., Clarence Whitman & Co., Inc., Renfrew Mfg. Co., and Eddystone Mfg. Co., are among the cotton concerns that have come up to this date, and the firms of J. Rapoport & Co., A. Beller & Co., and E. J. Wile & Co., are among the costumers who have

come. It has grown to be the habit of out-of-town retailers to include a visit to the American Museum as a part of their New York activities. In this way the educational value of the institution is widely disseminated, and this tendency will be much strengthened as time goes on. Lazarus & Co., a large retail store in Columbus, Ohio, re-

cently had an exhibition of Peruvian art. It was extensively advertised and had unquestioned educational value.

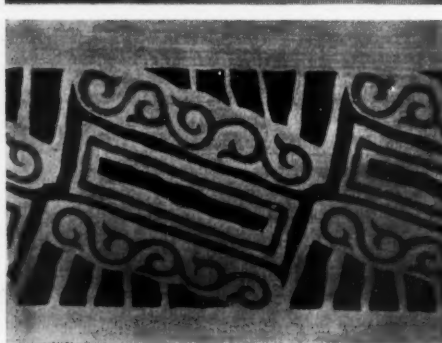
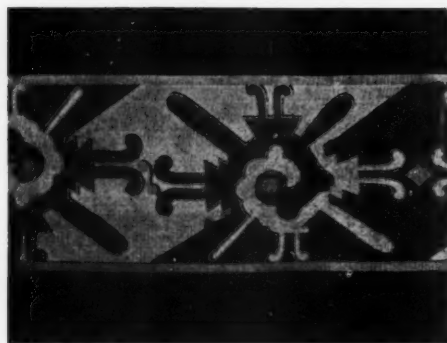
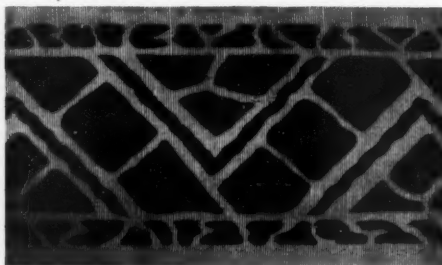
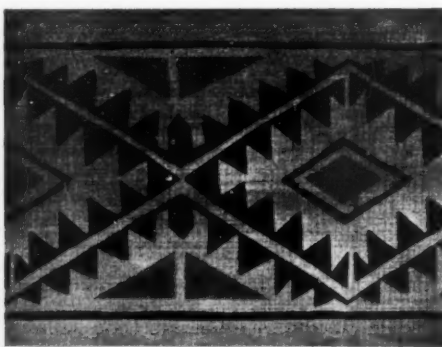
Thus it can be seen that at least the foundations for a national textile art have been laid, and that the part the American Museum has played in this movement is of importance. Educational work cannot be limited by the



These three designs were all taken directly from specimens in the American Museum, and are displayed in silks manufactured by John Wanamaker. The figure at the left is from a Peruvian poncho, that in the middle from a Mexican terra cotta stamp, and the one on the right from a Peruvian cylinder roller

commercial advantages which accrue to certain enterprising concerns, for the value to the country at large of a great and distinctive art must be obvious. Nothing, unless it be music, so unites a people as a similarity or a sympathy in their decorative associations. We are a nation composed of many strains of blood, a people which has drawn traditions from innumerable sources, and the political unity which

holds us together will be strengthened and vivified by an art which we may truthfully call our own. To make life a little more gracious; to make beautiful things a little more charming; to bring into the lives of millions of people simple things which carry a message of loveliness: this is the meaning of creative art in America, and this is one phase of the educational work that the American Museum is doing. This



The two upper designs at the left were taken from Aztec shields in the collections of the American Museum. The third is Mexican, the design signifying "sand and water." All three have been incorporated in silks manufactured by the Joseph Berlinger Company

Of the designs at the right, basketry and pottery motives from the Southwest inspired the two uppermost, taken from specimens in the American Museum's collections. The third design was suggested by the Amur River collections. Levinson and Bessels are the manufacturers

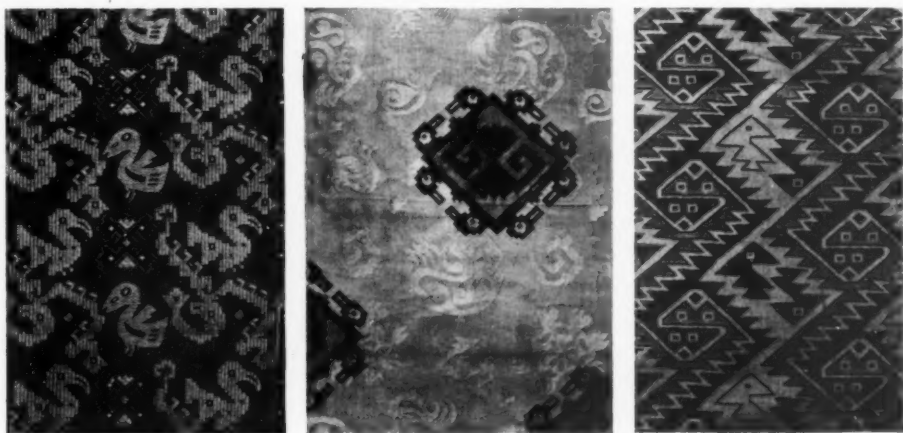
transcends in significance the commercial phases of the subject. The loom and the printing frame, the embroidery machine and the garment factory are but the fluid mediums through which the creative ability of American artists is reaching the American nation. And it is a matter of satisfaction to realize that the diffusion of the new ideas has been and will continue to be a profitable undertaking.

It is perhaps of human interest that through this movement and because of it, an increasing number of young American artists are receiving recognition and profitable employment, and it is not too much to say that they are developing a fine feeling of loyalty toward this Museum for the cordial reception they have received and the unfailing assistance that has been extended to them. To have taught so earnest a group to make use of the original sources of design in Museum material, is in itself an achievement. The habits thus acquired, leading to individual successes, will encourage artists just beginning their career to follow such examples, and the effects of

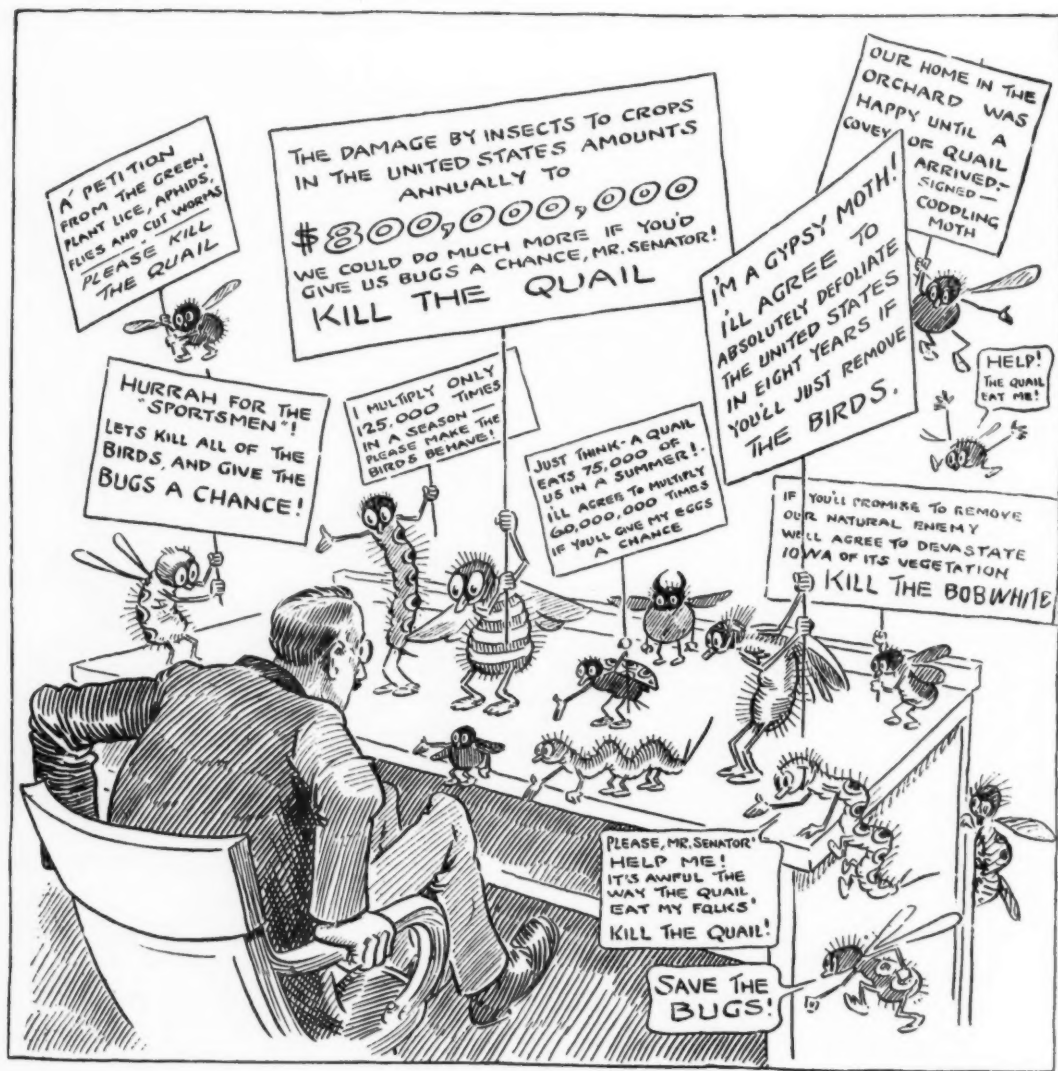
such association must eventually be felt in every branch of American decorative art. This is the true significance of the work.

This movement is the result of the unselfish and coöperative efforts of a number of men. To give a list here would occupy too much space. The members of the Museum staff and representatives of the industry who have given their time unsparingly in lectures and individual instruction have contributed largely to its success. But it must also be borne in mind that many other men for a generation have felt that some day such a movement must come, and have built up these wonderful collections so that the American Museum would be ready to give the service when the time was ripe,—these equally share the credit.

In the future, the fact that the collections of this Museum are of immense value to the artists and to the industry will be so obvious as to require no comment, but this article and the illustrations are intended to mark the first success in the campaign for creative design from New World inspiration.



The two outer panels, representing bird and conventionalized fish designs, were inspired by Peruvian textiles in the collections of the American Museum. The middle design of conventionalized birds was taken from the Peruvian, Amur River and Koryak collections of the Museum. They have been brought out in silks manufactured by the Central Textile Company



THE OHIO SENATOR RECEIVES A DELEGATION OPPOSED TO THE QUAIL BILL

This and six other cartoons, by W. A. Ireland, were published in the *Columbus Dispatch* during the fight for the protection of the quail in Ohio, and proved largely instrumental in rousing the state legislature to action. The Ohio quail bill saved this "game bird" by placing it on the "song bird" list—a classification none will question who has pleasant memories of the quail's musical "bobwhite" notes, and especially who knows its scatter song heard from the woods in the fall

The War for America's Wild Life

By WILLIAM T. HORNADAY

Director of the New York Zoological Park, and Campaigning Trustee of the Permanent Wild Life Protection Fund

ON account of the many and frequent changes in the conditions affecting wild life, the defenders of our fauna must maintain a close surveillance of their entire field of activity, in order to meet new dangers with new measures. Even during the past three years, so many changes have occurred that a new bird's-eye view of the national field is both desirable and interesting.

During the past five years two great classes of our wild life have been brought under good protection, and two more remain exposed to the dangers of extermination according to law. They stand as follows:

Under halfway protection

Both the singing and the songless insectivorous birds are now appreciated, and protected by state and federal laws; and they are increasing.

The migratory game birds are 75 per cent protected by the federal law, and they also are increasing.

In danger of extermination

The nonmigratory upland game birds are, as a rule, feebly and inadequately protected by their state laws; and in most localities they are rapidly vanishing through over-shooting, legal and illegal, and through other causes.

The big game of the West, outside the game sanctuaries, has been going out at a frightful rate; and to this rule there are only a limited number of local exceptions. Local extinction on a vast scale, and in the near future, seems certain to supervene.

Finally, far too much attention has been focused on the breeding and introduction of foreign game birds while the protection and rehabilitation of native species have been sadly neglected. The movement to breed exotic pheasants on game farms, at state expense,

extends, with a few barren intervals, across the continent. Alien species are bred and coddled, while our native species are shot. The most aggravated case of this kind has been on exhibition in Iowa, where the pheasant-devoted state game warden has bitterly fought—fortunately in vain—the state-wide demand for a five-year close season on quail and pinnated grouse.

In the fall of 1915 when the writer made a long tour of inspection through eleven western states, the alarming condition of the upland game birds of that vast region became painfully apparent. Throughout that whole area not one move had been made to give long close seasons to the sage grouse or the pinnated grouse, and both of those fine species were fast going down to oblivion. The big game was vanishing at a tremendously rapid rate, by over-shooting; and in several states female deer were being killed for sport.

The advent of the automobile and its concomitant "good roads" was like the sudden rising of a hundred thousand new dragons to destroy the remnant of game. Some of the stories told were alarming, and the game-slaughter pictures that came out of Texas were appalling. Some of the open seasons on the magnificent sage grouse began August 15, with chicks hardly able to fly, and the bag "limits" were a ghastly joke.

For the saving of the remnants of deer, elk, mountain sheep, and goats, and the restocking of lifeless areas, a workable plan for the making of game sanctuaries in national forests was

wrought out and launched in Congress, in December, 1915. Two and one half years of hard labor have been devoted to that Chamberlain-Hayden bill, and \$3,255 in money has been paid out in campaign expenses. Up to this date it has been a physical impossibility to secure a vote on the bill, in either house of Congress. We believe that the votes are there to pass the bill, whenever it can be brought to a vote. When enacted into law, it means anywhere from one hundred to one hundred and fifty big-game sanctuaries in national forests not suitable for grazing or agriculture; and until the bill is passed and signed, its supporters will strive for it.

In 1915, and again in 1916, two great contests were fought out in Congress, when the spring-shooting "sportsmen" of Missouri and adjacent territory undertook to kill the federal migratory bird law, by cutting off the annual \$50,000 for its enforcement. On both occasions they were routed. The principle of "no spring shooting" still stands like a Rock of Gibraltar for the defense of our one hundred and fifty-four species of migratory game birds.

But what of the upland game birds of the West? In the autumn of last year we started a great "drive," covering all the states west of the Mississippi, except Louisiana, Missouri, and Arkansas, for new game laws that would save the sage grouse and all other grouse and quail from extinction, and place them on a continuing basis. We began to hammer at the doors of nineteen state legislatures that convened early in January, 1917, hurried through their sixty-day sessions, and then stampeded for home. We spent six months of hard labor on that widespread campaign, \$2,350 in money, and about 15,000 pieces of "literature."

Our Bulletin No. 5 (8,000 copies) went to every legislator in the nineteen states, to hundreds of newspapers, and to thousands of picked leading citizens. The American Educators Conservation Society sent out 2,500 special appeals to educators, and 1,500 to lawmakers.

It was one of the most interesting campaigns we ever entered, and it won sweeping reforms in seven of the nineteen states. The real winnings were as follows,—but it is too bad that space limitations prevent mentioning by name each of the gallant men in the seven states who did the work:

Idaho—Important improvements were made in the wild life laws of Idaho. Sage grouse were given a close season until August 15, 1922; quail shooting was closed until 1920; the limit on deer was reduced from two to one; all big game killed must be tagged; and the regulations of the federal migratory bird law were made Idaho state law.

Montana—The protection of mountain sheep and goats was extended to 1922. The bag limit on deer was reduced from two to one, and the hunting season was shortened to two weeks. All upland game birds throughout the state are protected, except for an open season of two weeks. Killing elk merely for their teeth or heads is made a felony!

Nevada—In Nevada all grouse and mountain quail are protected until 1922. Mountain sheep, goats, and antelope are protected until 1930. The sale of game is prohibited, and the state bird laws are made to conform to the migratory bird law.

Utah—Utah achieved a sweeping victory. All upland game birds—grouse, ptarmigan, and quail—were given long close seasons. All shore birds, gulls, pelicans, and doves were permanently protected.

New Mexico—New Mexico has experienced a great awakening, and is fairly seething with the reform spirit. Nine game protective associations have been formed. Sage grouse, bobwhite quail, sheep, and antelope are protected for long periods. The state game and fish department is excellently managed, and public sympathy is now fully mobilized.

Arizona—In Arizona a "buck law" has been enacted, the bag reduced to one

deer per year, and the deer season has been reduced to thirty days. The wild-fowl season has been made to conform to the federal bird law, and the limit on quail has been reduced to twenty birds in a day.

Iowa—The Iowa legislature enacted two laws, in spite of fierce opposition by the state game warden and many "sportsmen," according five-year close seasons to quail and pinnated grouse throughout the state.

A great victory was won in Ohio, but hardly any portion of it belongs to our bow and spear. We did not start it, and we had very little to do with it, aside from promulgating widespread revilement of Ohio for its gameless and hopeless condition. The one thing that

roused the members of the Ohio legislature to action on the proposition to put all quail "in the class of song birds," and swept certain Ohio "sportsmen" off their feet as if by a cyclone, was a series of seven thrilling drawings by cartoonist W. A. Ireland, that were published at the right times in the *Columbus Dispatch*. These cartoons are so good that it really seems as though they would make mummies sit up and vote for quail protection!

Two of the states in which we made very vigorous campaigns, Wyoming and Texas, were sullenly obstinate and unyielding. Wyoming made no concessions whatever to wild life, and Texas,



Game slaughter as it was carried on in one state of the Union in 1915, and still continues there to the disgrace of America. Men, dogs, pump guns, and automobiles working together can quickly bring extinction to all the game of any region. Mountain sheep and antelope are already so nearly exterminated in Texas that the state has been forced to pass a law providing for long close seasons



UNDER THE PROTECTION OF THE UNITED STATES GOVERNMENT

Fortunately, before many more years are past, cooperation is certain to be established between state and national governments for the protection of wild life. This photograph, taken in the Wichita National Bison Range four years after protection was established, is a delightful illustration of the effect of complete protection on wild ducks

"the dark and bloody ground," yielded only a law giving long protection to her pitiful last remnants of mountain sheep and antelope. Arizona made good last year at her November election. Oregon, California, Colorado, Nebraska, the two Dakotas, Minnesota, Kansas, and Oklahoma yielded nothing of any real importance, but Minnesota came near to effecting a reform. A demand for a three-year close season for pinnated grouse was backed by the best sportsmen of the state.

The East that lies east of Pittsburgh is far more aroused for the perpetuation of wild life than is the West or the South. New Mexico is bubbling over with enthusiasm to bring back the game that once was so abundant in that state. Colorado is a sad example of the results of game laws that have looked good on the outside, but which have really been far too liberal to the hunter and too hard upon the game. Out of her once great stock of elk, deer of two species, mountain sheep, antelope, and bison, no hunting now is permitted of anything save rabbits and upland game birds! The big game is so fearfully scarce that all hunting of it has been stopped.

Texas is in a deplorable condition. With no paid game wardens, with lack of enforcement of ineffectual laws, and with automobiles and pump guns combined with a savage determination to kill until the last head of game is dead, the game is being swept away at a frightful rate.

The automobile, as a factor in game destruction, surely has come "slaying and to slay." It is doing its deadly work among the upland game birds through the whole width of the American continent. In India it operates with telling effect among the big game of the western Ghauts, and in Australia

it is fatally active among the kangaroos. New York and North Dakota have forbidden, by law, the use of the automobile in hunting—and all other states must do the same!

Public aversion to the killing of female deer has taken form in "buck laws" in twenty states. Quail now are protected by long close seasons in fourteen states. Prong-horned antelope are protected in all the states they inhabit, and mountain sheep are immune from slaughter in all states save Wyoming. The total number of migratory bird species protected by the federal law is 1,022.

The international migratory bird treaty with Canada was fully ratified on December 6, 1916. It lacks, however, an enabling act of Congress to carry its terms into effect, as well as \$200,000 to meet the cost of enforcement throughout the United States. The Hitchcock bill, introduced in the last session of the 64th Congress, was almost completely eviscerated in the committees to which it was referred, and its proposed appropriation (\$170,000) was calmly stricken out. If the people of the United States desire to see that treaty enforced, it is time for about one million of them to say so, and ask for the fund necessary! The bill was re-introduced in the new Senate on April 10, by Senator Smith, of Arizona (S. 1553), minus the \$170,000 absolutely required for enforcement in the forty-eight states.

The hardest fighting, and the most of it, that occurred in the great western drive for the protection of wild life, took place in Iowa over the quail. Eight college professors, representing seven institutions, a dozen Iowa editors, a goodly array of farmers, and strong bodies in the two houses of the legislature, fought the state game warden and

his "sportsmen" following, to a glorious finish. The final fight in the Senate lasted four hours, and ended in a victory for the quail, thirty-four to fourteen.¹

By their own acts and ethics, the men who shoot game are now dividing themselves into two distinct groups. Heretofore all the members of the entire body have been known as "sportsmen," chiefly because the line of cleavage has not been clearly defined. Now, however, the time has arrived when it is not only possible, but also necessary, to separate into two classes the men who hunt and kill game.

One class consists of real sportsmen, who may be defined as men with logical minds, high moral principles, ethical standards either developed or latent, and a willingness to make any personal sacrifice for the preservation and increase of wild life that circumstances may render necessary. The other class consists of men whom we shall call "gunners," whose minds are impervious to logic, who recognize nothing resembling broad policies in the protection of wild life, who are devoted to the gun and shooting, and who believe in killing game by every means that the law permits, as long as any game remains

alive, and regardless of the prospect of the extinction of species.

The word "sportsman" has reached the point where it must either disappear altogether or be split into fragments, each one bearing either a new name or a qualifying adjective. The time when the old and favorite term necessarily meant a game protector is gone by. The men who lack the sense of fairness, and the spirit of self-sacrifice which is found in every true sportsman, must now and henceforth be reckoned with separately.

The true sportsmen have joined hands with the great mass of the friends and protectors of wild life, who do not shoot and who never kill game. It is incumbent upon this class to meet the gunners whenever necessary, and fight the battles of the vanishing wild life. Today the gunners are still keeping up the senseless slaughter that disgraces Texas; but surely some day the people of that state will arouse from their lethargy. Whether they will do so before the game is entirely gone—remains to be seen.

The American people are big enough, and rich enough, and sufficiently numerous, to continue to defend and increase the wild life of the American continent, even during a war with Germany. War or no war, we must pay our taxes, educate our children, and protect our wild life and forests from destruction. We are strong to do all these things, at the same time that we join the World War for democracy and the rights of man.

¹ The factor that enabled the educational leaders of that fight to engage in it as they did, was nothing more nor less than two hundred and fifty paltry dollars in money that were thrown into the contest from the Permanent Wild Life Protection Fund, when none of the fighters had time to stop to raise campaign expense funds. It was very much like buying a victory for \$250; and when the whole western campaign was over, there remained in the treasury of the Permanent Wild Life Protection Fund only one hundred and twenty very lonesome dollars.

"A Garden in Every Yard"

SLOGAN FOR 1917 IN AMERICA

By JOHN H. FINLEY

President of the University of the State of New York and State Commissioner of Education

THE present food shortage and consequent increase in food prices have emphasized to the American people the necessity for immediate steps toward adequate food production. Conservation agencies interested in farming and those more generally concerned with the whole financial condition of the country agree that no other factor in our present national situation is of greater importance than careful and systematic preparation to secure the largest possible production of food crops during the present year. All the data collected for the government reports show that the quantities of grain and other products remaining upon the farms are less than one half the supply at this time last year. There seems to be no very great promise of an unusual crop for the coming year, and therefore it behooves every American citizen to do what he can in the way of producing, so far as possible, some of the food which he and his family will necessarily consume during the coming year. If production is not possible, the least that any one can do is to conserve carefully the food supply produced by others.

There is, throughout the land, a most intense interest in the campaign which has been started with the young people for more and better gardens. Every community should coördinate all of the forces—educational, social, business, and religious—interested in the promotion of garden work among young people and cause their efforts to be united in an effective campaign. A garden committee composed of a representative of each organization interested might well be formed to direct the work. The superintendent of schools or a member of the board of education might well be chairman of this committee. Whenever practicable a trained supervisor or director of this work should be employed by the board

of education to insure the proper development and permanency of the work. In the larger school systems teachers already in service, who have had some experience and training in garden work, might well be enlisted to act as local supervisors under the guidance of the trained director. In the smaller school systems, where possibly a director who will give his whole time to the work is impracticable or impossible, a teacher already in service might be retained during the summer, while, from the spring planting until the harvesting of the crops in the fall, he might give part time to the direction of garden work.

One of the first necessities is to arouse interest in the work among the young people of the community, but fully as important as this is securing the coöperation of the parents. It is quite necessary for the entire success of this movement, that the older people not only realize the importance of increased production during the coming year, but that they also take an active part in the production.

It is especially important that only good seeds and good plants be used. Therefore, those who are in charge of this work should see to it that those having gardens be referred only to reliable firms for seeds. In order that lack of capital may be no handicap to those desiring to take up the work, there should be provided and administered a loan fund for those who need assistance in buying manure, hiring vacant lots or large garden plots, and in paying for plowing and harrowing same.

Now is the time to deal with next winter's disturbances: high cost of living, boycotts, and embargoes. A national preparedness for either peace or war demands that immediate steps be taken by every individual to do his share in the production movement. "A garden in every yard" should be our slogan.



GEORGE K. CHERRIE, FIELD NATURALIST

EDITORIAL NOTE.—Mr. Cherrie is a veteran of the tropics. He has made twenty-seven faunistic expeditions into tropical countries and has visited every state in South America except Chile. He began his tropical field work in 1889, when he went to Costa Rica under contract with the Costa Rica government to collect natural history specimens and to do taxidermy work for the little natural history museum at San José. He soon became curator of birds and mammals there, and in connection with his work headed many expeditions into the high mountainous interior of the country, as well as along both the Atlantic and Pacific coasts of Costa Rica and Chiriquí. During the three years that he remained in Costa Rica he brought together a collection of twelve thousand bird skins, many of which found their way into American and European museums.

Returning to the United States in 1892, Mr. Cherrie became assistant curator in charge of the department of birds of the Field Museum of Chicago and immediately entered upon exploration work for that institution. He went into the West Indies, particularly into Santo Domingo and Haiti, and also made expedition into Florida, southern Texas and along the Gulf Coast. After three years' service with the Field Museum, he took up field work in northern South America as a personal venture, and for some years the results of his collecting and study went chiefly to the British Museum and the Rothschild Museum in England. Most of this time was spent in Venezuela on the Orinoco and its tributaries. Some of his most thrilling experiences with wild animals occurred during this stay in Venezuela, where also he passed through many personal dangers in connection with native revolutions.

He made later expeditions into the island of Trinidad, British Guiana, and French Guiana. Although his greatest work has been on birds, he has studied and collected mammals and other forms in the field as well. One gains an intimate knowledge of Mr. Cherrie through the pages of Colonel Roosevelt's *Through the Brazilian Wilderness*, the story of an expedition on which Mr. Cherrie acted as naturalist. With the permission of Charles Scribner's Sons, we make the following quotations:

"Cherrie was . . . born in Iowa, but [is] now a farmer in Vermont. He has a wife and six children. Mrs. Cherrie had accompanied him during two or three years of their early married life in his collecting trips along the Orinoco. Their second child was born when they were in camp a couple of hundred miles from any white man or woman. . . . He was an unusually efficient and fearless man; and willy-nilly he had been forced at times to vary his career by taking part in insur-

(Continuation on opposite page)

To South America for Bird Study

A STORY OF TRAVEL AND OF STRANGE HABITS OF BIRDS.—
PRELIMINARY REPORT BY THE CHERRIE-ROOSEVELT
EXPEDITION OF THE AMERICAN MUSEUM

By GEORGE K. CHERRIE

BEFORE the end of the Roosevelt Expedition of 1913-14, while we were still in the heart of South America, Colonel Roosevelt realized that the observations on the life and habits of the animals of the region through which we were rapidly journeying must of necessity be fragmentary. The work of that expedition, on which the famous "River of Doubt" was explored, was of necessity mainly geographical. Colonel Roosevelt accordingly determined that there should be one or two supplementary expeditions for field study of animals, particularly of birds. Mr. Leo E. Miller has already been sent into the field on what might be termed the Miller-Roosevelt Expedition of the American Museum, and in the fall of 1915 it was decided that the Cherrie-Roosevelt Expedition should be sent out the following spring. Inasmuch as Dr. Frank M. Chapman, of the American

Museum of Natural History, was making an expedition into the Andes of Ecuador, Peru, and Bolivia, it was felt that the interests of the work would be advanced by combining the forces of the two expeditions.

Accordingly the writer, in company with Dr. Chapman, left New York in May, 1916, for Colon, where we secured a steamer that took us through the Panama Canal and down the west coast of South America. We made our first stop at Guayaquil, Ecuador. From that point we went into the interior, stopping about half way to Quito at the town of Riobamba, which we made the base for our collecting work in that region. From Riobamba, we proceeded to the volcano of Chimborazo, where we camped, and did collecting at an altitude of fourteen thousand feet. We also did more or less collecting in the environs of Quito.

Returning to Guayaquil, we traveled

rections. Twice he had been behind the bars in consequence, on one occasion spending three months in a prison of a certain South American state, expecting each day to be taken out and shot." (P. 3.)

"Of all the party Cherrie's experiences had covered the widest range. This was partly owing to the fact that the latter-day naturalist of the most vigorous type who goes into the untrodden wastes of the world must see and do many strange things; and still more owing to the character of the man himself. The things he had seen and done and undergone often enabled him to cast the light of his own past experience on unexpected subjects. Once we were talking about the proper weapons for cavalry, and some one mentioned the theory that the lance is especially formidable because of the moral effect it produces on the enemy. Cherrie nodded emphatically; and a little cross-examination elicited the fact that he was speaking from lively personal recollection. . . ." (P. 179.)

"Cherrie, in addition to being out after birds in every spare moment, helped in all emergencies. He was a veteran in the work of the tropic wilderness. We talked together often, and of many things, for our views of life, and of a man's duty to his wife and children, to other men, and to women, and to the state in peace and war, were in all essentials the same. His father had served all through the Civil War, entering an Iowa cavalry regiment as a private and coming out as a captain; his breast-bone was shattered by a blow from a musket-butt, in hand-to-hand fighting at Shiloh." (P. 297.)

For a man of his achievement, Mr. Cherrie is extremely modest. Colonel Roosevelt is quoted as saying that the only occasion on which he ever witnessed any display of vanity in Mr. Cherrie was one day during the exploration of the "River of Doubt" when the party was in a starving condition and Mr. Cherrie came into camp with two howling monkeys he had shot. It was on this "River of Doubt" expedition that Colonel Roosevelt was so impressed with Mr. Cherrie's power as a field naturalist that he conceived the idea of sending him back into the region for intensive study. What he says has been quoted in the JOURNAL previously, but it is worth repeating:

"I think that a museum could now confer most lasting benefit, and could do work of most permanent good, by sending out into the immense wildernesses, where wild nature is at her best, trained observers with the gift of recording what they have observed. Such men should be collectors, for collecting is still necessary; but they should also, and indeed primarily, be able themselves to see, and to set vividly before the eyes of others, the full life-histories of the creatures that dwell in the waste spaces of the world." (P. 161.)



SOUTH AMERICAN HOMES OF PARRAKEET AND JABIRU

The great colony nests of the parrakeets are sometimes occupied by as many as one hundred pairs of birds. The construction of these nests, contrary to most nest-building operations, begins at the roof. Separate entrances, cunningly devised of thorny twigs to exclude enemies, lead to nursery chambers where from one to five families are reared

The jabiru, or giant stork, attains a height of five feet. In a rookery containing a colony of wood ibis I found a single jabiru which had established himself in the center of the colony, and built his nest on the extreme top of one of the trees, from which he overlooked the near nests of the ibis and in the distance the vast stretches of alluvial plain

down the coast to Callao, remaining, however, only one day, in order to visit Lima. While at Lima, we visited the zoölogical garden and other points of interest in and about that old city. From Callao we sailed down the coast to Mollendo, which is the port of entry to the high interior of Peru and Bolivia. From Mollendo there is railroad communication with Arequipa, Lake Titicaca, and Cuzco. Dr. Chapman remained at Arequipa, while I went on to Cuzco in order to arrange for transportation for a contemplated trip down the Urubamba Valley. While waiting for Dr. Chapman to join me, I spent much time visiting the Inca ruins in and about the city of Cuzco. A few days later we started on the expedition through the Urubamba Cañon, past Ollantaytambo, and on to Machu Picchu, the old Inca City of Refuge.

We made our camp at the foot of the mountain spur on which Machu Picchu is situated, devoting our time for a couple of days to securing a collection of birds typical of that region. Also we spent one day climbing to the top of the mountain spur in order to obtain photographs of the ruins that once again are being buried under tropical foliage. I shall long remember what a tremendous climb it was. Both hands and feet were employed as we worked our way along narrow ledges or scrambled up the nearly vertical cliffs, catching here and there on projecting bits of rock, or putting our faith in the strength of some aerial root stalk that clung close to the face of the cliff. Up, up, for almost three thousand feet, to the very topmost point of the mountain spur, from where we were able to look down on the ruins. Here we found that we were on what had once been a well-paved highway leading directly to the ruins. Sometimes we descended ancient stairways cut into the living rock, narrow and tortuous, pierced here and there by narrow channels that undoubtedly had been used for conducting water to the city. A day was spent among the ruins before we made the return journey, which was found to be even more difficult than the climb had been. Going down, it was necessary to hold on with the hands and feel carefully for a solid resting place for the feet, and as we were continually bringing into use a set of muscles that are not ordinarily employed in walking, we were pretty nearly exhausted

before we reached solid ground. We felt fortunate indeed that all the members of our party escaped without accident. There were many places in the descent where a misstep would have meant plunging for hundreds of feet down on the rocks below.

We then continued through the valley as far as Trinidad, which is located just at the edge of the tropic zone. Here we had opportunity to do some splendid bird collecting. The journey down the valley was a ride through a wonderland. On both sides of the Urubamba Cañon are continuous series of terraces that had made available for cultivation every foot of soil in the valley. The wonderful aqueducts for supplying water to these terraces are still intact in places.

We then packed our outfit and moved back toward the plateau in which rests Lake Titicaca. At Tirapata, near which is a small lake that Dr. Chapman desired to visit, the expedition divided, and I started on my journey across the continent for the interior of Matto Grosso in Brazil, in order to complete the observations that were begun during the Roosevelt Expedition in 1913-14.

My way lay first across Lake Titicaca. On a previous expedition I had crossed this lake at night; now I was pleased that I had an opportunity to go around the lake by day and stop at the various small ports and villages, an opportunity of which I availed myself with great satisfaction. But I was to be disappointed in the result. The season was midwinter, and neither saloons nor state rooms on the little steamers plying on Titicaca were heated. Even on deck in the sun it was cold, for the wind that came down from the hills around the lake was icy. The passengers stood about and shivered, although wearing all the wraps they possessed. Also the hills, instead of being bright green, were dull, gray, and lifeless. The two days' journey was one of great discomfort and the scenery was of little interest. I then went on to La Paz, Bolivia, from which point one can get railroad transportation through the Andes as far as Atocha, on the line toward the Argentine frontier. This journey also was not one I would wish to repeat for pleasure. All the passengers suffered greatly from the cold. The cars were not heated, although the temperature was ten degrees below zero. At

Atocha we had heard we could get good hotel accommodations. We finally found that the accommodations were a mud-floored shack with a room about twelve by twenty-four feet, containing ten cot beds. From Atocha a coach road leads to La Quiaca on the northern frontier of the Argentine. We left early one freezing morning, but suffered much distress on the journey because of the volumes of choking, blinding dust, which enveloped the coach from the start until we finally halted for the night at one of the little Bolivian towns.

From La Quiaca railroad transportation can be secured to Buenos Aires. It was to this city that the American Museum had forwarded a new outfit for me. Having reached Buenos Aires, and the mouth of the Parana River, I felt that I was finally embarked on the more important work of my expedition. As soon as I could make arrangements, I secured a steamer going up the Paraguay River, my first stop being at Asunción, where I had to remain a few days waiting for a boat that would carry me farther up the river. Collecting on this part of the journey began at Puerto Pinasco, in the Paraguayan *chaco*, a region in which little zoölogical work has been done. During the first Roosevelt trip Mr. Miller and I had made a short excursion from Asunción up the Pilcomayo River, the result of which proved so interesting that I was anxious to know more of the region. Probably one of the principal reasons that little is known of the *chaco*, is that the Indians throughout that region have been more successful than the natives in any other part of South America in retarding inroads by Europeans. Many expeditions which have started into the *chaco* region have been annihilated. Even today, although cattle ranches have been founded at one point or another, and companies formed for the exploitation of quebracho, for tanning leather, there is real danger from Indian attacks if one goes any distance back from the Paraguay River.

From Puerto Pinasco (the property of an American syndicate), there is a service railway running inland for a distance of about twenty-five miles, and from there on, a good cattle trail for another twenty-five miles into the interior, where is located a large cattle ranch at a point known as Fort Wheeler. Between Puerto Pinasco and Fort Wheeler I spent about two months collecting

birds and making a careful study of bird habits. I was successful in obtaining pictures of a number of species which have never previously been photographed. I also found many nests and eggs of rare forms. At Puerto Pinasco I was much interested to find flocks of a species of parakeet associating with flocks of cow-birds all feeding on the ground. They wandered about, following grazing cattle, walking, not hopping, and apparently feeding on whatever vegetable or animal substances they could secure. These were the same parakeets that later I found constructing great colony nests, occupied by from two or three pairs to one hundred pairs of birds. These nests had separate entrance ways into nursery chambers where from one to four or five families were reared. I found that these parakeets began the construction of the nest at the roof instead of at the foundation, contrary to most nest-building operations, and not infrequently used one of the large platform nests of the giant jabiru storks as a roof for their apartment dwelling.

I succeeded in getting many interesting pictures of rheas while in the *chaco* region. At the time of the Roosevelt Expedition, during our stop at Buenos Aires, we visited some of the large fur houses and saw thousands upon thousands of bales of reha plumes, and learned that for years the Indians and other native hunters had been hunting these birds ruthlessly. It did not seem possible that such enormous quantities of plumes could have been secured without depleting the reha population, but we found them very abundant indeed, scarcely a morning passing without our seeing nests and single eggs scattered here and there across the open *campo*. Day after day the Indians brought to camp loads of eggs that they had taken from nests. As is well known, several females lay eggs in the same nest, but incubation is attended to by the male bird only. He also takes care of the young. I found one nest containing thirty-seven eggs, and many others with a less number.

In October I embarked on a small steamer that carried me farther up the Paraguay River to Corumbá, Brazil. At Agua Blanca, three or four hours above Corumbá, I did my next collecting. Later I ascended the river for a distance of about five hundred miles to one of the large cattle *fazendas*, property of the Farquhar syndicate.

One day, on the trip up the river from Corumbá, members of our crew pointed excitedly to something ahead of us in the middle of the river. What was our astonishment to find as we drew nearer, that there were a couple of white-lipped peccaries swimming in midstream! They had undoubtedly taken to the water voluntarily in order to cross the river, which at that point must be at least five hundred yards wide. It was only a few moments before a boat was manned and the peccaries overtaken. That night we had roast pork for supper.

During my stay I was the guest of the superintendent of the *fazenda*, and made Descalvados (the headquarters of the ranch) the base of my operations. From that point I made excursions along both sides of the Paraguay River, and learned to know what the Panateles really are,—vast alluvial plains that during the rainy season are entirely submerged, the water varying in depth from a few inches to many feet. During the dry season much of this vast region is dry land, but everywhere so crossed and intersected with irregular channels of stagnant or sluggish water, that rarely can one ride more than a few hundred yards in a straight line without having to struggle through the mud and water of the ponds or streams.

The Panateles are the homes of immense flocks of many species of water birds—ducks, herons, grebes, and rails. While the greater part of the region is treeless, there are, nevertheless, small islands densely forested. These are rookeries for colonies of

egrets or various species of ibis. I had the pleasure of visiting a number of these colonies. The Indian guides that I had with me in the Panateles proved to be remarkably efficient. They were also relatively trustworthy zoölogical observers. From one of them I learned first that some of the rookeries, which are occupied from the first of August until the end of September by colonies of egrets, are later occupied by colonies of wood ibis, the latter not only occupying the same region but also employing the same nests as the egrets,—without even so much as a thorough housecleaning. In one of these rookeries, where there was a colony of wood ibis, I found a single jabiru which had established himself in the center of the colony, and built his nest on the extreme top of one of the trees, from which he not only overlooked the nests of the ibis, but also had an unobstructed view of the Panateles in all directions.

There were deer in the open country, as well as rheas, and storks—in fact, they were sometimes abundant. In one day's ride across the Panateles I counted forty bucks of the black-tailed swamp deer and numberless does. In addition to these, we saw a few specimens of the beautiful white-tailed deer, also puma, peccaries, and two species of anteater, besides countless numbers of birds of many varieties. Three months' work in this region of marshes and open plains—the last collecting point—supplied the expedition with collections which will prove of great interest to the public, as well as to the scientific work of the American Museum.



An Exhibit of Military Hygiene

HOW SCIENCE SUPPLIES THE NEEDS OF THE MODERN SOLDIER

By C-E. A. WINSLOW

THE department of public health of the American Museum has recently installed an exhibit on military hygiene, designed to deal with a problem at present of supreme interest to all of us—the needs and requirements of the modern soldier, and the part that science plays in supplying these needs.

In the matter of clothing for the soldier, two things are primarily considered: the texture and material, according to the climate in which the troops are to serve; and the color of the uniform. Although various distinctive colors give an *esprit de corps* to bodies of troops, modern warfare demands that in the field all other considerations must be subordinated to "low visibility." The relative values of colors in the field are illustrated in the exhibit by a series of samples of cloth for uniforms arranged according to their visibility from a distance, and accompanied by a color sketch showing soldiers in uniforms of various shades, seen at close range, at eight hundred and eighty yards, and at a distance of one mile. In the test of distance white has the highest visibility, red comes next; khaki and the olive drab at present in use in the United States Army fade away into the ordinary background at relatively close range.

The head covering of the soldier must protect the head and shield the eyes and the nape of the neck from the sun. While its nature depends on the locality in which the men are to serve, for temperate zones the campaign hat with the "Montana peak" proves very satisfactory. This kind of hat provides sufficient air space above the head, good circulation being insured by four eye-lets. For trench warfare a more efficient protection is required, and this is obtained by the use of the steel helmet, a sample of which from the French trenches is exhibited through the courtesy of Dr. Louis Livingston Seaman and the American Museum of Safety.

Among newly recruited troops ten per cent of the men used to be disabled by injuries due to ill-fitting shoes. It should be remem-

bered that under the weight of the body and the added weight of the equipment which the soldier carries, the foot may lengthen half an inch and broaden a quarter of an inch. This necessitates shoes of the right shape and size, and of flexible material. As a buffer between skin and leather, a thick woolen sock is used.

The equipment of the soldier should be as complete as possible without being so heavy that it fatigues him. If it is reduced too much, he is liable to suffer in camp through insufficient protection from the weather; and if it is very elaborate, his efficiency will become impaired from carrying too heavy a load. The weight carried on the march by a United States soldier varies from thirty-nine to sixty pounds. This should be so distributed that posture and the free movement of the chest and arms are not interfered with.

Among the items of the soldier's equipment featured in the exhibit is the typical daily field ration of the United States, an amount of food supplying 4,199 calories of energy and shown realistically in terms of bread and bacon and potatoes and other ingredients. There are also the mess kit, consisting of fork, spoon, knife, and meat can, the last to be used ordinarily as a plate, but in time of need also as a cooking dish; the canteen, which suffices to supply the few swallows of water so much better for the soldier on the march than a longer draught; the gas mask essential in the horrors of modern warfare; and the little sealed first aid packet of sterile dressings for the prompt bandaging of wounds, now supplied to our soldiers with instructions as to their proper application.

In the realm of camp sanitation there are models showing methods for the disposal of waste and the purification of water, factors which have played a large part in reducing the havoc wrought in war time in the past by diseases like cholera, dysentery, and typhoid fever. In the Crimean War, in pre-sanitary times, armies of the contending nations lost more than one third of their numbers from disease, and only one tenth from

wounds. Typhoid fever in the past was the worst scourge of the military camp. It killed 14 per 1,000 of the British soldiers in the Boer War, and 15 per 1,000 of our own soldiers during the Spanish War. Of the American soldiers in the Spanish War in 1898, 142 in 1,000 were sick with typhoid and 15 died, while only 14 in 1,000 were wounded in battle and 2 died. Today improved camp sanitation and above all antityphoid vac-

Cross field work, particularly in the typhus infected districts in Serbia; supplies from the Manhattan Chapter of the American Red Cross; the improved "trench stretcher," which is so constructed that it can be separated into halves along the middle line, allowing the attendant to transfer the wounded man to a cot by slipping the stretcher out from under him at each side; the lungmotor, loaned by the Life Saving Devices Company,



The exigencies of trench warfare call not only upon modern inventiveness in the preparation of safety appliances for the soldier, but also borrow from the war trappings of the past. At the left is a steel helmet, such as are being worn by the soldiers of the French Republic; at the right a primitive type of gas mask from the equipment of a soldier who was wounded at Verdun and died on the way back from the front in an ambulance of the American volunteer corps

cination offer almost complete protection against this disease. Vaccination against typhoid was first introduced in the American army in 1909, and made compulsory in 1912. The result was a reduction in the typhoid rate from 3.2 per 1,000 in 1908 to .03 in 1913. When 10,759 troops were encamped at Jacksonville in 1898, there were 1,729 cases of typhoid and 248 deaths, while among 20,000 troops encamped in a similar region during the Texas maneuvers of 1912, there were only two cases of typhoid and no deaths.

The care of the wounded is demonstrated by a series of objects: models showing Red

and used to restore respiration in cases of gas poisoning or drowning; and a machine, run by a small electric motor, used as a suction apparatus to dispose of excess amounts of blood and mucus during field operations.

Of particular interest is the group of objects illustrating the malady known as "trench foot," a gangrenous condition contracted by soldiers standing for days in water, as they frequently have to do in the trenches. It has been recently discovered in France that this disease is not the result of simple chill, but of invasion by molds, such as *Pencillium glaucum*, which enter from damp and filthy socks, penetrate cracks in

the skin, and block the blood and lymph vessels. This stoppage of circulation robs the tissues of the foot of their natural defenses, and leads to gangrene, which frequently necessitates amputation. There are on exhibition a broken shoe and a moldy sock such as those that have caused the prevalence of "trench foot" in the French army, and a culture of one of the molds at fault. There are shown also cultures of the gas bacillus, which infects the wounds of men living in the trenches in regions like Flanders, where the soil has been cultivated abundantly with manure. This bacillus, growing in the depths of the wound from which the air is

excluded, may reach the blood stream, where it produces gas bubbles that clog the blood vessels and cause death.

The exhibit properly includes pictures of several of the men who have rendered notable service in adding to the scientific knowledge of combating disease, even in some cases laying down their lives for the cause. We never can be too familiar with the faces and achievements of Walter Reed, Aristides Agramonte, James Carroll, Jesse W. Lazear, and Surgeon General Gorgas, heroes of the war against disease who conquered yellow fever in Havana and made possible the construction of the Panama Canal.

Museum Notes

SINCE the last issue of the JOURNAL, the following persons have become members of the Museum:

Life Members, MRS. JAMES B. HAGGIN, MRS. HORACE RUSSELL, and MESSRS. EDWARD DUDLEY KENNA and EDMUND J. SCHEIDER.

Annual Members, MRS. W. H. ALDRIDGE, MRS. AGNES C. L. DONOHUGH, MRS. WARNER M. LEEDS, MRS. RUFUS L. PATTERSON, MRS. WILLIAM A. READ, MRS. M. M. RIGLANDER, MRS. SAMUEL SLOAN, MRS. JACQUES WEINBERGER, MABEL CHOATE, the MISSES ANNA E. CHAIRES, ALICE S. COFFIN, MARGARET H. GARRARD, and MARY O. STEVENS, and MESSRS. F. H. BROWNELL, T. B. BRYSON, H. B. DOMINICK, F. H. ECKER, JOHN S. FISKE, MATTHEW C. FLEMING, HERMAN L. HEIDE, A. R. HERR, SEYMOUR WORRALL HYDE, HENRY NECARSULMER, GEO. M. SIDENBERG, FRANK V. STORRS, A. T. THOMSON, W. J. K. VANSTON, and G. H. WALBEIDGE.

IN the work of general preparedness now being carried on throughout the United States the American Museum is taking part along the following lines:

A meeting of the faculty was held on March 6, at which a Preparedness Committee was appointed by President Osborn, composed of Messrs. Frederic A. Lucas, George H. Sherwood, Henry E. Crampton, W. B. Matthew, Clark Wissler, C.-E. A. Winslow, Barnum Brown, Chester A. Reeds, George

N. Pindar, Fred H. Smyth, Charles Lang, and George B. Dill. A subcommittee was appointed with Mr. George N. Pindar as chairman to make arrangements for a military drill among the Museum men. Drills are now being held in the Philippine Hall on Mondays, Wednesdays and Fridays from eleven to twelve and from four to five. A second subcommittee was appointed to consider the matter of Red Cross and first aid instruction in the building. Of this committee Mr. George H. Sherwood is chairman, assisted by Dr. R. W. Tower and Miss Marguerite Engler. The work of this committee is further assisted by a special committee of which Miss Engler is chairman, that has been actively engaged in an inquiry into all forms of work which the women of the Museum may undertake. Blanks have been distributed for the registration of all employees in the lines of work they would be willing to undertake in case of need, these blanks to be eventually turned over to the National Council of Defense. Believing that the women of the Museum can do more effective work along the lines in which they are daily employed than by organizing a Red Cross Auxiliary for the making of hospital supplies, yet wishing to assist in Red Cross work, it was decided to undertake to secure members for the Red Cross Society both in the Museum and among friends outside. For this purpose another special committee was formed with Mrs. N. C. Nelson as chairman.

Permission has been granted by the trustees of the Museum for the establishment of an enrollment center in the Museum building for the purpose of helping in the work of taking the State Census. The time allotted for such service will be so arranged that the work of each department will not be seriously interfered with. To promote an interest in gardening there is under consideration a series of lectures on agriculture to be held in the Museum building in the near future.

At the meeting of the executive committee of the American Museum on April 18, Mr. Waldron DeWitt Miller, assistant curator of birds, was advanced to the rank of associate curator.

A letter from Mr. Miller reports his safe arrival at Corinto, Nicaragua, on March 10, only one day behind schedule time—an unusual record for a country in which transportation facilities are limited and uncertain. At Corinto Mr. Miller was joined by Mr. William B. Richardson, the veteran collector of tropical birds, whose long residence in Nicaragua has especially fitted him for efficient coöperation in carrying to a successful conclusion Mr. Miller's plan for an ornithological reconnaissance in Nicaragua. Mr. Miller writes that, with Mr. Richardson, he called upon the President of Nicaragua, and received from him personal letters to the authorities residing in the localities which the expedition proposes to visit. He also states that in the museum at Managua, the capital, he found five species of birds not heretofore recorded from Nicaragua; while, on the afternoon of his arrival at Corinto, he observed in a mangrove swamp at the border of the town a vireo of which there is only one previous record for Nicaragua, and which is wholly unrepresented in the collections of the American Museum.

THE American Museum of Natural History has a profound desire for a more definite and more cordial affiliation with the scientific museums of Central and South America, and hails with satisfaction any step in the direction of increased friendly acquaintance and coöperation. It is therefore a pleasure to know that on the Museum's recent South American Expedition Dr. Frank M. Chapman was most cordially welcomed by the naturalists connected with the Museo Nacional in Buenos Aires. A spe-

cial meeting of the Argentine Society of Natural Sciences and the Ornithological Society of the Plata was held, and Dr. Chapman was given the opportunity to tell of the itinerary and purposes of the work undertaken by our expedition. Also Mr. Leo E. Miller was given the opportunity to describe his experiences on the Roosevelt-Rondon Expedition. Addresses were made by the resident scientists, Dr. Angel Gallardo, director of the museum at Buenos Aires, Dr. Roberto Dabbene, president of the Ornithological Society, and Dr. J. M. de la Rúa, president of the Society of Natural Sciences. Dr. Chapman was made an honorary member of the Ornithological Society, and a corresponding member of the Society of Natural Sciences. The friendly relations established at this time in Buenos Aires—added to those made at other points along the route of the expedition—have already given rise to exchanges of valuable material. In connection with these exchanges the American Museum acknowledges the receipt just at the moment of collections of birds from the Museu Paulista at São Paulo, Brazil, the Museo Nacional at Buenos Aires, and the Natural History Museum at Mendoza, Argentina.

PROFESSOR HENRY FAIRFIELD OSBORN, president of the American Museum, has given to the press the following expression of his views on the "interning" of the liquor traffic: "I am supporting war prohibition. Alcohol was long regarded as of medical value. It has now been proved by scientific experiment to be a poison both to the present and to the coming generation. Like other heart and brain stimulants, it gives at best a temporary impulse to the system, followed by a reaction which enfeebles the system in normal reaction and resistance and predisposes it to disease."

IN conjunction with the exhibit of military hygiene at the American Museum of Natural History there is being shown by automatic stereopticon a series of more than eighty scenes from the western battle front of France. These illustrate trench life, demolished buildings, scenes from Rheims and the battlegrounds of Champagne and the Somme, and show views from town and country characteristic of trench-scarred France. The slides were obtained by the department of

public health of the Museum from Dr. Walter B. James, a trustee of the institution, and Mr. Marcel Knecht, a representative in this country of the French National Committee.

WITH characteristic impetuosity and enthusiasm all America has thrown itself heart and soul into the movement of gardening for the good of the country and for the support of the Allies. Men, women, and children are arming with spade and hoe; golf links, school grounds, vacant lots, and even lawns and back yards are being plowed. In order that energy may not be wasted, courses in gardening are being given by various agricultural schools, and pamphlets containing information on gardening are being spread abroad for the instruction and guidance of all who will undertake the work. Extensive summer courses in agriculture will be given at many institutions, including Columbia University, the New York School of Agriculture, Cornell University, Syracuse University, and St. Lawrence University. At the New York Botanical Garden simple courses in home gardening are being given. Federal, state, and city governments are coming to the aid of the individual with advice on proper methods of farming, as well as with offers of seed at moderate cost—or free as the case may demand. Real estate men are placing land at the disposal of gardeners or offering it to the Government at a low figure. Seventy-five thousand acres in New York City alone, it is estimated, have thus been added to the acreage available for vegetable gardens, much of which will be planted to potatoes. The National Emergency Food Garden Commission of Washington, D. C., has issued a *Food Garden Primer*, giving detailed information in condensed form on "How to Have a Good Garden," and Mayor Mitchel's Food Supply Committee of this city has put forth a similar pamphlet. New York, as befits the first city of the land, leads in organization and methods of procedure. The Mayor's Committee on Food Gardens is tabulating all the available vacant land, and supplying seeds at reasonable prices to those who wish to raise vegetables. The land is first examined by soil experts to determine its suitability for farming, and is then apportioned in plots to applicants. Already twelve hundred such plots have been assigned within the city

limits and still the demand exceeds the supply. Ninety thousand bushels of seed potatoes recently received from Maine are being distributed for planting. But the movement is not confined to one city or locality. It is nation wide. Congress plans to help the regular farmer and thus stimulate further the production of food in the present emergency. Organization and coöperation will assist both the individual and the community by bringing better methods and better machinery within the reach of all.

PROFESSOR STEWART A. SMITH, of the University of Sydney, Australia, read a paper before the American Ethnological Society at the American Museum on April 30, entitled "The Talgai Skull, a Fossil Human Skull Found at Queensland, Australia." This remarkable relic, which is destined to become almost as famous as the Piltdown skull, was found buried in a deposit of apparently Pleistocene age. Although it was discovered about thirty years ago, it remained unknown to scientists until recently it chanced to be brought to the notice of Professor J. T. Wilson, a well-known zoölogist. Fortunately the original discoverer is still living, and was able to identify the locality where the skull was found. The specimen is thoroughly fossilized and has been badly distorted by the pressure of the surrounding matrix. It is of commanding importance, since it is a proto-Australian type with an almost apelike form of the upper dental arch, and with very large canines and premolars. Professor Smith has presented a cast of the skull to the Museum.

On Sunday, April 29, Sir Ernest Shackleton, the noted antarctic explorer, lately elected an Honorary Fellow of the American Museum of Natural History, gave an address before the Explorers' Club of this city at a luncheon given in his honor at the Hotel Majestic. In the course of his short talk Sir Ernest said that the United States had entered the war at the psychological moment and by "rising to the height of which she is capable" could be a power in finishing the conflict at an early day. He himself is sailing immediately to rejoin the English navy. Twelve of the men who accompanied him on his trip to antarctic regions are already at the front, and eleven more will be there soon. One of the twelve was killed on his first day

in the trenches. The explorer further said: "This country has taken its stand. Money and ships will be needed from you but more than that is necessary; it is necessary for the manhood of the nation to stand up and meet the sacrifices that may be entailed."

Theodore D. Rousseau, the Mayor's secretary, on behalf of Mayor Mitchel, who could not be present, presented the key of the city to Sir Ernest Shackleton.

On the evening of the same day, at a meeting held in Carnegie Hall under the joint auspices of the American Museum of Natural History and the American Geographical Society, an audience of twenty-five hundred people greeted Sir Ernest with great enthusiasm. His account of long months spent in an ice-locked region, enduring hardships almost beyond comprehension, was given simply and intermingled with flashes of true Irish humor which delighted his hearers. Nights spent on floating icebergs which were momentarily expected to break up, followed by days in small boats which might at any instant be crushed like eggshells, were regular features of the attempt to cross the south polar sea, an attempt which had finally to be abandoned. To graphic description were added many pictures lending reality to the scenes. Great credit belongs to the leadership which brought back from such a hazardous undertaking the same number of men that went forth. In closing his lecture Sir Ernest spoke of the war situation and the necessity that the Allies stand together in the "great adventure." The proceeds of this lecture go to the war relief fund.

On Tuesday, May 1, Sir Ernest Shackleton visited the American Museum as the guest of President Henry Fairfield Osborn.

DR. HERBERT J. SPINDEN, of the American Museum, and Mr. Sylvanus G. Morley, of the Carnegie Institution of Washington, are spending a few weeks in an archaeological survey in Central America. This work, which is undertaken with the consent of the Central American governments, will probably take them to Guatemala, western Honduras, Salvador, and Nicaragua, and they will pay particular attention to the study and collection of such designs, dyestuffs, native foods, and samples of weaving and costumes as seem to have significance for our country in view of the present war conditions.

IN the recent death of William Hayes, night watchman since 1910 in the American Museum of Natural History, the institution loses a trustworthy and efficient member of its force. It wishes to express to his friends and to those associated with him on the Museum staff appreciation of these years of faithful service.

MR. N. C. NELSON was recently sent by the American Museum to make a brief reconnaissance of Indian shell mounds in the vicinity of Oak Hill and New Smyrna, Florida. These mounds, it was learned not long ago, had been largely cut into in the course of a campaign of road construction, and at least one of them had been very nearly demolished by the steam shovels. Others are, however, intact, and still offer an attractive field for excavation. Such mounds are frequently found to contain bones, refuse, and even implements, all of which are of value in reconstructing the life of the past. During his stay Mr. Nelson visited Tallahassee to confer with Dr. E. H. Sellards, state geologist of Florida.

THE examining board of the United States Army has qualified Mr. Barrington Moore, associate curator of woods and forestry in the American Museum, as a captain of engineers, and instructed him to report at the training camp at Plattsburg, May 8.

THE Museum has recently received as a gift from Mr. Henry Hornbostel a large series of valuable photographs from Central America. These were taken by Mr. Teoberto Maler of the Peabody Museum of Harvard University. They deal almost exclusively with fine examples of Maya temple architecture.

THE teeth of the devilfish recently killed by Colonel Theodore Roosevelt, while the guest of Mr. Russell J. Coles on a fishing cruise off the coast of Florida, are being examined by Dr. Louis Hussakof. This work is in continuation of a study of the anatomy of the devilfish begun by Dr. Hussakof during his connection with the department of ichthyology of the American Museum.

The Geographical Review of April, 1917, prints an illustrated article by Mr. Leo E. Miller, "Up the Orinoco to the Land of the Maquiritares." It is a description of the

zoölogical reconnaissance undertaken in the fall of 1912 by Mr. Miller and Mr. Francis X. Iglseider under the auspices of the American Museum of Natural History. The purpose of the expedition was to explore the wilds of Rio Cunucunuma and Mount Duida, a region incorrectly mapped, of whose people and animal life little was known. Mr. Miller also has an article, "The Quest of the Cock-of-the-Rock," with an introduction by Colonel Roosevelt, in the May issue of *Scribner's Magazine*.

THE latest addition to the series of guide leaflets on the collections of the American Museum is the sixteen-page *Syllabus Guide to Public Health Exhibits* by Mr. Laurence V. Coleman. This publication gives valuable information in concise form regarding the models, charts, and photographs in the hall of public health, illustrating the problems connected with procuring a clean water supply, disposing of municipal wastes, and doing away with insect-borne diseases.

MR. JOHN T. NICHOLS, of the Museum's department of fishes, has returned from a three weeks' cruise among the Florida keys where he went in late March, as the guest of Mr. Herman Armour Nichols of Chicago, to study especially the habits of ground sharks of the genus *Carcharhinus*. These are everywhere the most abundant sharks in inshore waters, where the females resort in numbers at certain seasons to give birth to their young. Two species were met with which are doubtless of regular and common occurrence there in March and April, although one of them (the green shark) had not previously been recorded from Florida; they are the edged shark (*C. limbatus*) and the green shark (*C. acronotus*), the former between five and five and one half, the latter between three and one half and four feet long. As is the case with the brown shark (*C. milberti*) of New York waters in summer, females only were present. Probably the big bulls have a more offshore habitat, certainly they are great wanderers, those of *C. limbatus* occasionally straggling as far north as New York in the warmer months. The edged shark was found to be very good eating, its meat resembling swordfish in flavor and not being at all tough. The fact that several species of shark are not regularly in the market is due entirely to prejudice.

As is often the case, the rarest fish obtained on the cruise was a very small one, captured entirely by accident. On one occasion the fifty-foot cruising ketch "Yuma" lay three nights at one anchorage, held up by high winds. When the big storm anchor was lifted, a clingfish (*Gobiesox*) about an inch long came aboard attached to it and was promptly placed in a vial of preservative. It has so far been impossible to identify this fish as any species known to science. The clingfishes have a peculiar sucking disk on the lower surface of the body by means of which they can hold firmly to any submerged object.

THE department of anthropology of the American Museum was visited recently by Professor Robert G. Aitken, of the Lick Observatory of the University of California, and also by Dr. L. J. Fraughtenberg, linguist of the Bureau of Ethnology in Washington. Dr. Fraughtenberg gave particular study to the anthropological collections from the Northwest Coast and the states of Washington and Oregon.

THE hermit thrush is so rare and nests in such impenetrable and dark places in the forest that few photographs of any kind have been secured of it. The frontispiece of this number of the JOURNAL, Mr. Norman McClintock's photograph of the hermit thrush in its home life, is therefore unusually valuable. It is interesting along three lines: first, zoölogically—especially since it shows the spotted plumage of the young, so strong a mark of the family to which the thrushes belong; second, humanly, for this is the bird immortalized by naturalist, philosopher, and poet for its song; and third, technically, as a triumph of bird photography. It chanced, however, that the photograph was not taken with a telephoto, nor under any unusual circumstances, but was a study at close range made from a blind with an ordinary 8" lens. It would seem that the hermit thrush and its spiritual song are far removed from war and the tragedy of Europe today, but this is the bird whose serene notes will always be known as a "carol of death," for at the close of the Civil War, our American poet, Walt Whitman, linked the song unforgetably with war and heroic death—"the song of the bleeding throat, Death's outlet song of life"—in his *Memories of President Lincoln*.